



Chapter 5 - Compliance Monitoring Programs

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Chapter Highlights

One potential pathway for exposure (primarily to workers) to contaminants released from the Idaho National Environmental and Engineering Laboratory (INEEL) is through the water pathway (surface water, drinking water, and groundwater). The Management and Operating contractor monitors liquid effluents, drinking water, groundwater, and storm water runoff at the INEEL to comply with applicable laws and regulations, U.S. Department of Energy orders, and other requirements (e.g., Wastewater Land Application Permit [WLAP] requirements). Argonne National Laboratory-West (ANL-W) and the Naval Reactors Facility (NRF) conduct their own WLAP equivalent and drinking water monitoring. The Environmental Surveillance, Education and Research Program (ESER) contractor monitors drinking water and surface water at offsite locations.

During 2003, liquid effluent and groundwater monitoring was conducted in support of WLAP requirements for INEEL facilities that generate liquid waste streams covered under WLAP rules. The WLAPs generally require compliance with the state of Idaho groundwater quality primary and secondary constituent standards in specified groundwater monitoring wells. The permits specify annual discharge volume and application rates and effluent quality limits. As required, an annual report was prepared and submitted to the Idaho Department of Environmental Quality (DEQ). Additional parameters are also monitored in the effluent in support of surveillance activities.

Most wastewater and groundwater regulatory and surveillance results were below applicable limits in 2003. The concentration of total dissolved solids (TDS) in the October 2003 sample from perched water well ICPP-MON-V-200 was above the state of Idaho groundwater secondary constituent standard (SCS). The elevated level of total dissolved solids in this well is likely caused by the effluent discharged to the Idaho Nuclear Technology and Engineering Center (INTEC) New Percolation Ponds. Aluminum, iron, and manganese secondary standards were also exceeded in three wells, including the upgradient well. It is unlikely that these contaminants are related to the discharge of wastewater because (1) similar concentrations were found in the upgradient well, (2) this is the same wastewater that has been discharged for a number of years to the old percolation ponds and never exceeded the standards in those compliance wells, and (3) the concentrations of these constituents in the discharged wastewater have decreased since August 2003. It is more likely that these concentrations are related to incomplete development of the wells, allowing residual well seal



material to exist in the vicinity of the well screen. This notion is supported by the logbook note that the samples were murky during collection and that duplicate samples collected in October that were passed through a 45-micron filter before analysis all were below groundwater standards.

As in the past, perched water samples from the INTEC sewage treatment plant contained measurable concentrations of total coliform bacteria. Nitrate-nitrogen was above the state of Idaho groundwater primary constituent standard (PCS) value in one perched well in April. While above the PCS, this is a sign that significant nitrogen conversion is taking place in that the majority of nitrogen discharged to the sewage treatment plant is in the form of ammonium-nitrogen.

Well Test Area North (TAN)-10A continued to have chemical constituents that were above groundwater quality standards. TAN-10A exceeded the SCS for iron and TDS. As detailed in the 2001 and 2002 annual reports, it is probable that the concentrations of these contaminants are related to the condition of the well casing and the 2001 rehabilitation work. Two compliance wells and the background well also exceeded the groundwater standard for total coliform bacteria in the April 2003 samples. The source of this contamination is under investigation. All other surveillance monitoring of groundwater, drinking water, and surface water were below applicable standards in 2003. Although some storm water samples exceeded benchmark levels for iron, magnesium, total suspended solids, and chemical oxygen demand, they were still within the range of historical values. All other measured parameters were below regulatory limits.

No U.S. Environmental Protection Agency (EPA) health-based drinking water or DOE regulatory limits were exceeded in 2003. In the Radioactive Waste Management Complex (RWMC) public water system and well, carbon tetrachloride remained below the EPA established maximum contaminant level (MCL) of 5 µg/L. The MCL applies only at the compliance point, which is the distribution system. The annual average for the compliance point of the distribution system was 2.8 µg/L. The annual average for the production well, of 4.6 µg/L, was also below the MCL. Trichloroethylene concentrations in samples from the Test Area North (TAN) drinking water Well 2 during 2003 also remained below the MCL. The ANL-W and NRF systems were sampled as required by regulations and found to be below all limits during 2003.

Elevated levels of tritium continue to be measured in the groundwater at the INEEL. Neither of these radionuclides has been detected off the INEEL since the mid-1980s. A maximum effective dose equivalent of 0.88 mrem/yr (8.8 µSv/yr), less than the four mrem/yr EPA standard for public drinking water systems, was calculated for workers at the Central Facilities Area on the INEEL in 2003.

No nonradiological constituents exceeded their respective WLAP, PCS/SCS, or MCLs in compliance and surveillance monitoring of liquid effluent samples. Permit required groundwater monitoring samples exceeded SCSs for aluminum, iron, manganese, and total and fecal coliform in wells at the new INTEC percolation ponds, sewage treatment plant, and the TAN/Technical Support Facility sewage treatment plant.

Drinking water samples were collected from 13 locations off the INEEL and around the Snake River Plain in 2003. No samples had measurable gross alpha activity. One had measurable tritium, and 19 samples had measurable gross beta activity. None of the samples exceeded the EPA MCL for these constituents.

As required by the General Permit for storm water discharges from industrial activity, visual examinations were conducted and samples were collected from selected locations. The visual examinations performed in 2003 showed satisfactory implementation of the *INEEL Storm Water Pollution Prevention plan for Industrial Activities* (DOE-ID 2002), and no corrective actions were required or performed during the year. Total suspended solids, iron, magnesium, and chemical oxygen demand all exceeded benchmark levels in samples collected at the RWMC. Concentrations of these parameters have been detected above benchmark levels in the past. No deficiencies in pollution prevention practices have been identified, and no cause has been identified. An October 27, 2003, letter from the EPA Region 10 to the DOE, Idaho Operations Office (DOE-ID) chief counsel, determined that three sites at the INEEL (RWMC, INTEC, and the north part of the INEEL property near Birch Creek [area around TAN]) do not have a reasonable potential to discharge storm water to waters of the United States (Ryan 2003). As a result, on December 15, 2003, the DOE-ID contract officer directed the BBWI Prime Contracts manager to cease compliance activities associated with the Storm Water Pollution Prevention Plan for Industrial Activities, Storm Water Pollution Prevention Plan for Construction Activities, and Spill Prevention Control and Countermeasures Programs at these three sites (Bauer 2003).

5. COMPLIANCE MONITORING PROGRAMS

Operations at facilities located on the Idaho National Engineering and Environmental Laboratory (INEEL) release radioactive and nonradioactive constituents into the environment. These releases are in compliance with regulations and monitoring of these releases ensures protection of the public and environment. This chapter presents results from radiological and nonradiological analyses of liquid effluent, groundwater, drinking water, and storm water samples taken at both onsite and offsite locations. Results from sampling conducted by the Management and Operating (M&O) contractor; Argonne National Laboratory-West (ANL-W), the Naval Reactors Facility (NRF); and the Environmental Surveillance, Education and Research Program (ESER) contractor are all presented here. Results are compared to the appropriate regulatory limit (e.g., liquid effluent discharge permit limits, U.S. Environmental Protection Agency (EPA) health-based maximum contaminant levels (MCL) for drinking water, and/or the U.S. Department of Energy (DOE) Derived Concentration Guide (DCG) for ingestion of water).

This chapter begins with a general overview of the organizations responsible for monitoring the various types of water at the INEEL in Section 5.1. Sections 5.2 and 5.3 describe liquid effluent and groundwater monitoring as required by the City of Idaho Falls and Wastewater Land Application Permit (WLAP) and effluent monitoring that is done for surveillance activities only, respectively. The INEEL drinking water programs are discussed in Section 5.4. Section 5.5 describes storm water monitoring, while Section 5.6 summarizes onsite waste management water surveillance activities.





5.1 Summary of Monitoring Programs

The M&O contractor monitors liquid effluents, groundwater, drinking water, and storm water runoff at the INEEL to comply with applicable laws and regulations, DOE orders, and other requirements (e.g., WLAP requirements).

The ESER contractor monitors drinking water at offsite locations and collected 28 drinking water samples for analyses in 2003.

The NRF monitors liquid effluent and drinking water to comply with applicable laws and regulations, proposed WLAP conditions, or as best management practices. Effluent samples were analyzed for radionuclides, inorganic constituents, and purgeable organic compounds, while drinking water parameters are covered by State and Federal regulations.

ANL-W also performs independent monitoring of liquid effluent and drinking water at its facility to comply with applicable laws and regulations, proposed WLAP conditions, or as best management practices. Industrial and sanitary liquid effluent samples are analyzed for gross activity (alpha and beta), tritium, inorganics, and water quality parameters. Drinking water parameters are covered under State and Federal regulations.

The INEEL Oversight Program collects split samples with the M&O and other INEEL contractors of liquid effluents, groundwater, drinking water, and storm water. Results of the Oversight programs monitoring are presented in annual reports prepared by that organization and are not reported here.

Table 5-1 presents the various water-related monitoring activities performed on and around the INEEL.

5.2 Liquid Effluent and Related Groundwater Compliance Monitoring

The M&O contractor monitors for nonradioactive and radioactive parameters in liquid waste effluent and groundwater. Wastewater is typically discharged to the ground surface and evaporation ponds. Discharges to the ground surface are through infiltration ponds, trenches, or a sprinkler irrigation system at the following areas

- ♦ Infiltration ponds at the Idaho Nuclear Technology and Engineering Center (INTEC) New Percolation Ponds, Test Area North/Technical Support Facility (TAN/TSF) Sewage Treatment Plant Disposal Pond, and Test Reactor Area (TRA) Cold Waste Pond;
- ♦ INTEC Sewage Treatment Plant infiltration trenches; and
- ♦ A sprinkler irrigation system at the Central Facilities Area (CFA) used during the summer months to land-apply industrial and treated sanitary wastewater.

Discharge of wastewater to the land surface is regulated under Idaho WLAP rules (IDAPA 58.01.17). An approved WLAP will normally require monitoring of nonradioactive parameters in the influent waste, effluent waste, and groundwater, as applicable. The liquid effluent and

Table 5-1. Water-related monitoring at the INEEL and surrounding area.

Area/Facility ^a	Media				
	Liquid Effluent (Permitted)	Liquid Effluent (Characterization)	Liquid Effluent (Groundwater)	Drinking Water	Storm Water
Argonne National Laboratory-West					
ANL-W		•	•	•	
Management and Operating Contractor					
CFA	•	•		•	•
INTEC	•	•	•	•	• ^c
TRA	• ^b	•	•	•	
TAN	•	•	•	•	• ^c
RWMC				•	• ^c
PBF/CITR				•	•
IRC	•				
Naval Reactors Facility					
NRF		•	•	•	
Environmental Surveillance, Education and Research Program					
INEEL/Regional				•	
INEEL Oversight Program					
INEEL/Regional		•	•	•	•
<p>a. ANL-W = Argonne National Laboratory-West, CFA = Central Facilities Area, INTEC = Idaho Nuclear Technology and Engineering Center, TRA = Test Reactor Area, TAN = Test Area North, RWMC = Radioactive Waste Management Complex, PBF/CITR = Power Burst Facility/Critical Infrastructure Test Range, IRC = INEEL Research Center, and NRF = Naval Reactors Facility.</p> <p>b. The Idaho DEQ has not issued a Wastewater Land Application Permit for TRA. However, TRA follows WLAP regulations for the applicable effluent.</p> <p>c. Monitoring ceased in December 2003.</p>					

groundwater monitoring programs support WLAP requirements for INEEL facilities that generate liquid waste streams covered under WLAP rules. Table 5-2 lists the five facilities operated by the M&O contractor that require WLAPs and the current permit status of each facility.

The WLAPs generally require compliance with the Idaho groundwater quality primary constituent standards (PCS) and secondary constituent standards (SCS) in specified groundwater monitoring wells (IDAPA 58.01.11). The permits specify annual discharge volume and application rates and effluent quality limits. As required, an annual report is prepared and submitted to the Idaho Department of Environmental Quality (DEQ).



During 2003, the M&O contractor conducted monitoring as required by the permits for each of the first four facilities listed in Table 5-2. The TRA Cold Waste Pond has not been issued a permit; however, quarterly samples for total nitrogen and total suspended solids (TSS) are collected to show compliance with the regulatory effluent limits for rapid infiltration systems. The following subsections present results of wastewater and groundwater monitoring for individual facilities conducted for permit compliance purposes.

Additional parameters are also monitored in the effluent to comply with DOE Order 5400.5 and 450.1 (DOE 1993, DOE 2003) environmental protection objectives. Section 5.3 discusses the results of liquid effluent surveillance monitoring for individual facilities operated by the M&O contractor and those additional facilities monitored by ANL-W (Industrial Waste Ditch and Pond, the ANL-W Sanitary Lagoons), and the NRF (Industrial Waste Ditch).

Table 5-2. Current M&O Contractor Wastewater Land Application Permits.

Facility	Permit Status	Explanation
CFA Sewage Treatment Plant	WLAP expired	Idaho DEQ issued a letter authorizing continued operation under the terms and conditions of original permit until a new permit is issued. Negotiation of a draft permit began in spring 2004.
INTEC New Percolation Ponds	WLAP issued	Idaho DEQ originally issued the WLAP on September 10, 2001. The permit was subsequently modified and a new permit issued on March 28, 2002, and expires on April 1, 2007.
INTEC Sewage Treatment Plant	WLAP expired	Idaho DEQ issued a letter authorizing continued operation under the terms and conditions of original permit until a new permit is issued.
TAN/ TSF Sewage Treatment Plant	WLAP expired	Idaho DEQ issued a letter authorizing continued operation under the terms and conditions of original permit until a new permit is issued. Negotiation of a draft permit began in spring 2004.
TRA Cold Waste Pond	WLAP application submitted to Idaho DEQ	Idaho DEQ has not issued a WLAP. Idaho DEQ authorized INEEL to operate the wastewater land application facility under the conditions and terms of State of Idaho WLAP rules and Idaho DEQ's Handbook for Land Application of Municipal and Industrial Wastewater until a permit is issued [Johnston 2001].

Idaho Falls Facilities

Description - The City of Idaho Falls is authorized by the *Clean Water Act*, National Pollutant Discharge Elimination System (NPDES) to set pretreatment standards for nondomestic wastewater discharges to publicly owned treatment works. The DOE - Idaho Operations (DOE-ID) Office and M&O contractor facilities in Idaho Falls are required to comply with the applicable regulations in Chapter 1, Section 8 of the Municipal Code of the City of Idaho Falls.

Industrial Wastewater Acceptance Forms were obtained for facilities that discharge process wastewater through the City of Idaho Falls sewer system. Twelve M&O contractor facilities in Idaho Falls have associated Industrial Wastewater Acceptance Forms for discharges to the city

sewer system. The Industrial Wastewater Acceptance Forms for these facilities contain special conditions and compliance schedules, prohibited discharge standards, reporting requirements, monitoring requirements, and effluent concentration limits for specific parameters; however, only the INEEL Research Center has specific monitoring requirements.

Wastewater Monitoring Results - Semiannual monitoring was conducted at the INEEL Research Center in April and October of 2003. Table 5-3 summarizes the 2003 semiannual monitoring results.

Table 5-3. Semiannual monitoring results for INEEL Research Center (2003).^a

Parameter	INEEL Research Center		Discharge Limit ^b
	April 2003	October 2003	
Cyanide	0.005 U ^c	0.005 U	1.04
Silver	0.0025 U	0.0025 U	0.43
Arsenic	0.0025 U	0.0025 U	0.04
Cadmium	0.0010 U	0.0010 U	0.26
Chromium	0.0025 U	0.0025 U	2.77
Copper (regular/duplicate) ^d	0.0410	0.0366/0.0366	1.93
Mercury	0.00020 U	0.00020 U	0.002
Nickel	0.0025 U	0.0025 U	2.38
Zinc (regular/duplicate) ^d	0.0422	0.0416/0.0414	0.90
Lead (regular/duplicate) ^d	0.00051	0.00044/0.00028	0.29
Conductivity (µS) (max/avg) ^e	1,176/699	5,232/1,761	N/A
pH (standard units) (max/avg) ^e	8.11/8.0	7.92/6.4	5.5-9.0

a. All values are in milligrams per liter (mg/L) unless otherwise noted.

b. Limit as set in the applicable Industrial Wastewater Acceptance Forms.

c. U flag indicates that the result was below the detection limit.

d. Regular and duplicate samples were collected for the October sampling event only. Unless otherwise noted, for parameters for which results were detected, the regular and duplicates were the same.

e. Values represent the maximum and average for the five samples taken in April and the four samples taken in October over an eight-hour period during semiannual monitoring.

Central Facilities Area Sewage Treatment Plant

Description - The CFA Sewage Treatment Plant (STP) serves all major facilities at CFA. It is southeast of CFA, approximately 671 m (2200 ft) downgradient of the nearest drinking water well.

A 1500-L/min (400-gal/min) pump applies wastewater from a 0.2-ha (0.5-acre) lined, polishing pond to approximately 30 ha (74 acres) of desert rangeland through a computerized center pivot irrigation system. The permit limits wastewater application to 25 acre-in./acre/yr from March 15 through November 15, and limits leaching losses to 8 cm/yr (3 in./yr).



WLAP Wastewater Monitoring Results - The permit requires influent and effluent monitoring, as well as soil sampling in the application area (see Chapter 7 for results pertaining to soils). Influent samples were collected monthly from the lift station at CFA (prior to Lagoon No. 1) during 2003. Effluent samples were collected from the pump pit (prior to the pivot irrigation system) starting in June 2003 and continued through September 2003 (the period of irrigation operation for 2003). All samples collected were 24-hr composites, except pH and coliform samples, which were collected as grab samples. Tables 5-4 and 5-5 summarize the results.

Table 5-4. CFA STP influent monitoring results (2003).^{a,b}

Parameter	Minimum	Maximum	Average ^c	Permit Limit
Biological Oxygen Demand (5-day)	23.0	59.1	45.1	NA ^d
pH (standard units) (grab)	7.62	8.21	7.84	NA
Chemical Oxygen Demand	41.8	196.0	97.1	NA
Nitrogen, Nitrate + Nitrite (mg-N/L)	0.336	1.220	0.655	NA
Nitrogen, Total Kjeldahl	1.48 ^e	24.90	12.28	NA
Total Suspended Solids	18.9	324.0	68.0	NA

a. All values are in milligrams per liter (mg/L) unless otherwise noted.

b. Duplicate samples were collected in April for all parameters (excluding pH) and the duplicate results are included in the summaries.

c. Annual average is determined from the average of the monthly values.

d. NA—Not applicable; no permit limit is set for this parameter.

e. The minimum shown is from the April duplicate sample.

Table 5-5. CFA STP effluent monitoring results (2003).^a

Parameter	Minimum	Maximum	Average ^b	Permit Limit
Biological Oxygen Demand (5-day)	2.14	7.38	4.26	NA ^c
pH (standard units) (grab) ^d	8.77	9.89	9.44	NA
Chemical Oxygen Demand	34.5	41.6	37.9	NA
Nitrogen, Nitrate + Nitrite (mg-N/L)	0.0115	0.0714	0.0321	NA
Total Phosphorus	0.213	0.408	0.293	NA
Nitrogen, Total Kjeldahl	1.81	6.70	3.92	NA
Total Suspended Solids	2 ^e	6.5	3.1	NA
Fecal Coliform (colonies/100 mL)	1	29	8	NA
Total Coliform (colonies/100 mL)	1	80	24	NA

a. All values are in milligrams per liter (mg/L) unless otherwise noted.

b. Annual average is determined from the average of the monthly values. Half the reported detection limit was used in the yearly average calculation for those data reported as below the detection limit.

c. NA—Not applicable; no permit limit is set for this parameter.

d. pH readings were collected on two separate days in July and are included in the summaries. The minimum pH reading was from one of these samples.

e. Sample result was less than the detection limit; value shown is half the detection limit.

Discharge to the pivot irrigation area averaged less than 598,095 Lpd (158,000 gpd). Application rates ranged from 7.20 to 8.20 m³/day (0.07 to 0.08 acre-in./day) during the entire 2003 application period of June 16, 2003, through September 25, 2003.

The total volume of applied wastewater for 2003 was approximately 7.38×10^{12} L (5.98 million gallons [MG]), which is significantly less than the design hydraulic loading of 4.9×10^{13} L (40.5 MG). Hydraulic loading peaked in September. Nitrogen loading rates were significantly lower (3.01 kg/ha/yr [2.7 lb/acre/yr]) than the projected maximum loading rate of 35.87 kg/ha/yr (32 lb/acre/yr). As a general rule, nitrogen loading should not exceed the amount necessary for crop utilization plus 50 percent. However, wastewater is applied to native rangeland without nitrogen removal via crop harvest. To estimate nitrogen buildup in the soil under this condition, a nitrogen balance was prepared by Cascade Earth Sciences, Ltd. (CES), which estimated it would take 20 to 30 years to reach normal nitrogen agricultural levels in the soil (based on a loading rate of 35.87 kg/ha/yr [32 lb/acre/yr]). The extremely low 2003 nitrogen loading rate of 3.01 kg/ha/yr (2.7 lb/acre/yr) had a negligible effect on nitrogen accumulation.

The 2003 annual total chemical oxygen demand (COD) loading rate at CFA STP (29.14 kg/ha/yr [26 lb/acre/yr]) was less than the 2002 rate (53.80 kg/ha/yr [48 lb/acre/yr]) and was substantially less than the state guidelines of 56.04 kg/ha/day (50 lb/acre/day) (equivalent to 20,456 kg/ha/yr [18,250 lb/acre/yr]).

The annual total phosphorus loading rate (0.217 kg/ha/yr [0.194 lb/acre/yr]) was well below the projected maximum loading rate of 5.04 kg/ha/yr (4.5 lb/acre/yr). The small amount of phosphorus applied was probably removed by sorption reactions in the soil and used by vegetation, rather than lost through leaching.

Removal efficiencies (REs) were calculated to estimate treatment in the lagoons. Average REs were lower than the previous year for total nitrogen, biological oxygen demand (BOD), and COD, but equal to the previous year for total dissolved solids (TSS). Only BOD and TSS achieved the projected efficiency (i.e., total nitrogen, BOD, and TSS of 80 percent and COD of 70 percent). During 2003, the average REs indicate that treatment in the lagoons was sufficient to produce a good quality effluent for land application.

A total of 759.46 m³/ha (2.99 acre-in./acre) of wastewater was applied over approximately 29.7 ha (73.5 acres) during 2003, which was 11.07 cm (4.26 in.) less than that applied in 2002. This total, when adjusted for irrigation efficiency and added to the total adjusted precipitation for the year, yields 1427 m³/ha (5.62 acre-in./acre), which is well below the permit limit of 6350 m³/ha/yr (25 acre in./acre/yr). The relatively low volume of wastewater, coupled with below average annual precipitation (lower by 11.18 cm [4.4 in.]) and above average monthly temperatures for all months of the permit year (with the exception of November 2003), resulted in a leaching loss of only 0.25 cm (0.10 in.).

WLAP Groundwater Monitoring Results - The WLAP does not require groundwater monitoring at the CFA STP.





Idaho Nuclear Technology and Engineering Center New Percolation Ponds

Description - The Percolation Ponds receive only nonhazardous wastewater. Wastewater with the potential to contain hazardous constituents is disposed of in accordance with the applicable *Resource Conservation and Recovery Act* requirements. Sanitary wastes from restrooms and the INTEC cafeteria are either discharged to the INTEC STP or directed to onsite septic tank systems.

The New INTEC Percolation Ponds were placed into service August 26, 2002, and the INTEC Existing Percolation Ponds were isolated from further use. During normal operations, INTEC generates an average of 1 to 2 MG/day of process wastewater (commonly called service waste) that is discharged to the New Percolation Ponds. The service waste system serves all major facilities at INTEC. This process-related wastewater from INTEC operations consists primarily of steam condensates, noncontact cooling water, reverse osmosis products, water softener and demineralizer regenerate, and boiler blowdown wastewater.

All service waste enters Building CPP-797, the final sampling and monitoring station, before discharge to the Percolation Ponds. In CPP-797, the combined effluent is measured for flow rate and monitored for radioactivity, and samples are collected for analyses. No radioactivity is expected; however, if radioactivity is detected above a specified level, contaminated waters are directed to a diversion tank rather than discharged to the Percolation Ponds. Two sets of two pumps transfer the wastewater from CPP-797 to the Percolation Ponds.

The New INTEC Percolation Ponds are designed to function similarly to the old percolation ponds south of INTEC. The new pond complex is a rapid infiltration system and is comprised of two ponds excavated into the surficial alluvium and surrounded by bermed alluvial material. Each pond is approximately 93 x 93 m (305 x 305 ft) at the top of the berm and is about 3-m (10 ft) deep. Each pond is designed to accommodate a continuous wastewater discharge rate of approximately 11 million L/day (three million gal/day).

During normal operation, wastewater is discharged to only one pond at a time. Periodically, the pond receiving the wastewater will be alternated to minimize algae growth and maintain good percolation rates. During 2003 the south pond was in use from January to July. The north pond was used from August through December. Ponds are routinely inspected, and the water depth is recorded via permanently mounted staff gauges.

WLAP Wastewater Monitoring Results - The WLAP for the New Percolation Ponds requires effluent monitoring, as well as groundwater sampling. A 24-hr flow-proportional composite sample is collected monthly from the sample point in CPP-797 for all parameters except pH, which is taken as a grab sample as required by the permit. Table 5-6 summarizes the effluent results from the New INTEC Percolation Ponds.

Sample collection for the New Percolation Ponds began in September 2002, after the wastewater was rerouted from the Existing Percolation Ponds to the New Percolation Ponds on August 26, 2002.

Table 5-6. Summary of New INTEC Percolation Pond effluent monitoring results (2003).^a

Parameter	Minimum	Maximum	Average ^b	Permit Limit
pH (standard units) (grab) ^c	7.5	8.3	8.0	NA ^d
Chloride	15.9	647	175.5	NA
Fluoride	0.005 ^e	0.26	0.18	NA
Nitrogen, as Nitrite (mg-N/L)	0.002 ^e	0.85 ^e	0.07 ^f	NA
Nitrogen, as Nitrate (mg-N/L)	0.53	1.00	0.91	NA
Nitrogen, Total Kjeldahl	0.065 ^e	0.12 ^e	0.08 ^f	NA
Nitrogen, Total	0.95	1.50	1.07	NA
Total Dissolved Solids	242.0	1,210.0	494.3	NA
Total Phosphorus	0.0174	0.043	0.026	NA
Silver	0.00075 ^e	0.0016 ^e	0.0009 ^f	NA
Aluminum	0.0027 ^e	0.0204	0.0065	NA
Arsenic	0.00175 ^e	0.00265 ^e	0.00218 ^f	NA
Cadmium	0.00015 ^e	0.0021	0.0004	NA
Chromium	0.0056	0.0086	0.0062	NA
Copper	0.00045 ^e	0.0113	0.0042	NA
Iron	0.00275 ^e	0.218	0.029	NA
Mercury	0.00004 ^e	0.00004 ^e	0.00004 ^f	NA
Manganese	0.00015 ^e	0.003	0.001	NA
Sodium	39.2	351.0	110.0	NA
Selenium	0.00175 ^e	0.00245 ^e	0.0020 ^f	NA

a. All values are in milligrams per liter (mg/L) unless otherwise noted.

b. Annual average is determined from the average of the monthly values. Half the reported detection limit was used in the yearly average calculation for those data reported as below the detection limit.

c. Duplicate pH readings were taken in January and are included in the summaries.

d. NA—Not applicable; no permit limit is set for this parameter. Effluent limits are specified in IDAPA 58.01.17.600.06.B, Wastewater Land Application Permit Rules.

e. Sample result was less than the detection limit; value shown is half the detection limit.

f. All the results were less than the detection limit. Therefore, the average is based on half the reported detection limit for each of the monthly values.

The permit for the New Percolation Ponds does not specify concentration limits for the effluent to the ponds. However, effluent concentrations were compared to the groundwater quality standards. During 2003, comparison of the effluent concentrations to the groundwater quality standards, showed only total dissolved solids (TDS) and chloride were above the standards (during four months). However, because no permit limits are set for the effluent, these levels do not reflect permit noncompliances. During these same four months, the sodium concentrations in the effluent were also high, and the TDS, chloride, and sodium concentrations were some of the highest reported to date for the CPP-797 service waste effluent. High concentrations of TDS, chloride, and sodium in the service waste effluent are usually indicative of a problem with the





CPP-606 water treatment system. During the year, several evaluations were conducted in support of a project to upgrade the current INTEC water treatment system. These evaluations included a survey of the treated water demands, water quality requirements, and candidate conservation measures. Several design options to upgrade the water treatment system are currently being evaluated.

The flow volumes to the New Percolation Ponds were recorded daily from the flow meter located in CPP-797. Total flow discharged to the New Percolation Ponds in 2003 was approximately 1820 million L (480.9 MG). The total volume was well below the permit limit of 4145 million L (1095 MG/yr).

WLAP Groundwater Monitoring Results - To measure potential impacts to groundwater from the New Percolation Ponds, the permit requires that groundwater samples be collected semiannually from six monitoring wells:

- ♦ One background aquifer well (ICPP-MON-A-167) upgradient of the New Percolation Ponds;
- ♦ One background perched water well (ICPP-MON-V-191) north of the New Percolation Ponds and just south of the Big Lost River;
- ♦ Two aquifer wells (ICPP-MON-A-165 and -166) downgradient of the New Percolation Ponds; and
- ♦ Two perched water wells (ICPP-MON-V-200 and ICPP-MON-V-212) adjacent to the New Percolation Ponds. Well ICPP-MON-V-200 is north of the New Percolation Ponds and well ICPP-MON-V-212 is between the two ponds.

The permit requires that samples be collected semiannually during April and October and provides a specified list of parameters to be analyzed for in the groundwater samples. Aquifer wells ICPP-MON-A-165 and ICPP-MON-A-166 and perched water wells ICPP-MON-V-200 and ICPP-MON-V-212 are the permit compliance points. Contaminant concentrations in the compliance wells are limited by the groundwater PCS and SCS in IDAPA 58.01.11. All permit required samples are collected as unfiltered samples.

Tables 5-7 and 5-8 show water levels (recorded before purging and sampling) and analytical results for all parameters specified by the permit for aquifer and perched water wells, respectively. Perched water well ICPP-MON-V-191 was dry during both the April and October 2003 sampling events. Well ICPP-MON-V-191 is expected to remain dry until the Big Lost River flows sufficiently to recharge the perched water at this well.

The October 2003 TDS sample result for well ICPP-MON-V-200 was above the SCS of 500 mg/L. Both chloride and sodium concentrations have increased since 2002 in this well. The increase in these parameters likely has been caused by the effluent concentrations in the service waste wastewater and the application of this wastewater to the New Percolation Ponds. No parameter concentrations for well ICPP-MON-V-212 were above their respective PCS or SCS

Table 5-7. New INTEC Percolation Ponds groundwater quality data from aquifer wells for April and October 2003.^a

Depth to Water Table (ft)	ICPP-MON-A-167 (GW-013005)			ICPP-MON-A-165 (GW-013006)			ICPP-MON-A-166 (GW-013007)			PCS/SCS ^b
	495.53	495.29	495.29	500.62	500.62	500.62	505.13	505.13	506.48	
Sample Date	4/14/2003	10/6/2003	10/6/2003 ^c	4/15/2003	10/6/2003	10/6/2003	4/14/2003	4/14/2003 ^c	10/6/2003	
pH	8.46	7.88	7.88	8.20	7.55	7.55	8.06	8.06	7.52	6.5–8.5
TKN	0.90 U ^d	1.0 U	1.0 U	1.8 U	1.0 U	1.0 U	0.90 U	0.90 U	1.0 U	NA ^e
NO ₃ -N	0.48	0.46	0.43	0.76	0.62	0.62	0.26	0.23	0.14	10
NO ₂ -N	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	1
Total Phosphorus	0.20	0.31	0.27	0.074	0.10 U	0.10 U	0.03 U	0.062	0.10 U	NA
TDS	205	203	213	224	234	234	185	175	178	500
Chloride	12.5	7.1	7.2	16.2	17.5	17.5	6.8	13.6	6.8	250
Fluoride	0.19	0.11	0.13	0.21	0.12	0.12	0.26	0.24	0.14	4
Aluminum	6.61	5.82	6.74	0.025 U	0.025 U	0.025 U	0.199	0.231	1.06	0.2
Aluminum–filtered	NT ^f	0.0362	0.0392	NT	NT	NT	NT	NT	0.025 U	0.2
Arsenic	0.0026	0.0033	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.05
Arsenic–filtered	NT	0.0025 U	0.0033 U	NT	NT	NT	NT	NT	0.0025 U	0.05
Cadmium	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.005
Cadmium–filtered	NT	0.001 U	0.001 U	NT	NT	NT	NT	NT	0.001 U	0.005
Chromium	0.0136	0.0147	0.0186	0.0105	0.0084	0.0084	0.0078	0.0091	0.0177	0.1
Chromium–filtered	NT	0.0053	0.0063 U	NT	NT	NT	NT	NT	0.0052	0.1
Copper	0.0157	0.0174	0.0182	0.001 U	0.0014	0.0014	0.001 U	0.001 U	0.004	1.3
Copper–filtered	NT	0.0013	0.0017	NT	NT	NT	NT	NT	0.001 U	1.3
Iron	3.92	3.68	4.13	0.0613	0.0655	0.0655	0.217	0.238	0.939	0.3
Iron–filtered	NT	0.077	0.0824	NT	NT	NT	NT	NT	0.0612	0.3
Manganese	0.0696	0.0681	0.0758	0.0025 U	0.0025 U	0.0025 U	0.0697	0.0692	0.072	0.05
Manganese–filtered	NT	0.009	0.0098	NT	NT	NT	NT	NT	0.0376	0.05
Mercury	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.002
Mercury–filtered	NT	0.0002 U	0.0002 U	NT	NT	NT	NT	NT	0.0002 U	0.002





Table 5-7. New INTEC Percolation Ponds groundwater quality data from aquifer wells for April and October 2003.^a
(continued)

Depth to Water Table (ft)	ICPP-MON-A-167 (GW-013005)			ICPP-MON-A-165 (GW-013006)			ICPP-MON-A-166 (GW-013007)			PCS/SCS ^b
	495.53	495.29	495.29	500.62	500.62	500.62	505.13	505.13	506.48	
Sample Date	4/14/2003	10/6/2003	10/6/2003 ^c	4/15/2003	10/6/2003	10/6/2003	4/14/2003	4/14/2003 ^c	10/6/2003	
Selenium	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.05
Selenium –filtered	NT	0.0025 U	0.0025 U	NT	NT	NT	NT	NT	0.0025 U	0.05
Silver	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.1
Silver–filtered	NT	0.0025 U	0.0025 U	NT	NT	NT	NT	NT	0.0025 U	0.1
Sodium	13.4	13.9	14.0	8.08	10.0	10.0	9.15	9.22	9.75	NA
Sodium–filtered	NT	12.7	12.9	NT	NT	NT	NT	NT	9.66	NA

a. All concentrations are in milligrams per liter (mg/L), except pH, which is in standard units.

b. Primary constituent standards (PCS) and secondary constituent standards (SCS) in groundwater referenced in IDAPA 58.01.11.200.01.a and b.

c. Duplicate sample.

d. U flag indicates that the result was reported as below the detection limit.

e. NA = Not applicable.

f. NT = Not Taken. No filtered metal sample was taken.

Table 5-8. New INTEC Percolation Ponds groundwater quality data from perched water wells for April and October 2003.^a

Depth to Water Table (ft)	ICPP-MON-V-191 (GW-013008)		ICPP-MON-V-200 (GW-013009)		ICPP-MON-V-212 (GW-013010)		PCS/SCS ^c
	Dry ^b	April 2003 Not Sampled	Dry ^b	October 2003 Not Sampled	Dry ^b	October 2003 Not Sampled	
Sample Date							
Parameter							
pH	— ^d	—	8.04	7.52	8.13	7.56	6.5-8.5
TKN	—	—	1.8 U ^e	1.0 U	1.8 U	1.0 U	NA ^f
NO ₃ -N	—	—	0.82	0.93	0.69	0.84	10
NO ₂ -N	—	—	0.10 U	0.10 U	0.10 U	0.10 U	1
Total Phosphorus	—	—	0.043	0.10 U	0.074	0.10 U	NA
TDS	—	—	407	554	404	412	500
Chloride	—	—	91.4	213	66.8	112	250
Fluoride	—	—	0.28	0.39	0.14	0.21	4
Aluminum	—	—	0.707	0.251	0.0321	0.0591	0.2
Aluminum—filtered	—	—	NT ^g	0.025 U	NT	NT	0.2
Arsenic	—	—	0.0029	0.0025 U	0.0025 U	0.0025 U	0.05
Arsenic—filtered	—	—	NT	0.0029	NT	NT	0.05
Cadmium	—	—	0.001 U	0.001 U	0.001 U	0.001 U	0.005
Cadmium—filtered	—	—	NT	0.001 U	NT	NT	0.005
Chromium	—	—	0.0063	0.0075	0.0061	0.0066	0.1
Chromium—filtered	—	—	NT	0.0063	NT	NT	0.1
Copper	—	—	0.0026	0.0029	0.001	0.001	1.3
Copper—filtered	—	—	NT	0.0024	NT	NT	1.3
Iron	—	—	1.240	0.355	0.0631	0.147	0.3
Iron—filtered	—	—	NT	0.0566	NT	NT	0.3
Manganese	—	—	0.0202	0.0054	0.0025U	0.0025 U	0.05
Manganese—filtered	—	—	NT	0.0025U	NT	NT	0.05
Mercury	—	—	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.002





Table 5-8. New INTEC Percolation Ponds groundwater quality data from perched water wells for April and October 2003.^a (continued)

Depth to Water Table (ft)	ICPP-MON-V-191 (GW-013008)		ICPP-MON-V-200 (GW-013009)		ICPP-MON-V-212 (GW-013010)		PCS/SCS ^c
	Dry ^b	October 2003 Not Sampled	117.85	10/7/2003	238.25	10/7/2003	
Sample Date Parameter	April 2003 Not Sampled	October 2003 Not Sampled	4/17/2003	10/7/2003	4/22/2003	10/7/2003	
Mercury—filtered	—	—	NT	0.0002 U	NT	NT	0.002
Selenium	—	—	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.05
Selenium—filtered	—	—	NT	0.0025 U	NT	NT	0.05
Silver	—	—	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.1
Silver—filtered	—	—	NT	0.0025 U	NT	NT	0.1
Sodium	—	—	47.10	134.0	11.40	21.2	NA
Sodium—filtered	—	—	NT	133.0	NT	NT	NA

a. All concentrations are in milligrams per liter (mg/L), except pH, which is in standard units.

b. ICPP-MON-V-191 is a perched well and was dry in April 2003 and October 2003 when permit-required sampling was performed. Therefore, the well could not be sampled.

c. Primary constituent standards (PCS) and secondary constituent standards (SCS) in groundwater referenced in IDAPA 58.01.11.200.01.a and b.

d. Because the well could not be sampled, no analyte-specific results are available.

e. U flag indicates that the result was reported as below the detection limit.

f. NA = Not applicable.

g. NT = Not Taken. No filtered metal sample was taken.

during 2003. However, TDS, chloride, and sodium concentrations appear to be increasing since 2002.

Aluminum and iron concentrations in well ICPP-MON-V-200 were also above their respective SCSs (Table 5-8). The concentrations for aluminum, iron, and manganese in aquifer wells ICPP-MON-A-167 and ICPP-MON-A-166 were above the SCSs during at least one sample event in 2003 (Table 5-7). Well ICPP-MON-A-167 is the background aquifer monitoring well and is not regulated to these standards by the permit.

It is unlikely that the elevated levels of these parameters in the aquifer wells could be the result of the disposal of wastewater to the new ponds for the following reasons:

- ♦ Well ICPP-MON-A-167 was selected as the up gradient (background) monitoring well and should not be affected by discharges to the new ponds;
- ♦ The concentrations of aluminum, iron, and manganese in the effluent since August 26, 2002, are considerably lower than the concentrations in the aquifer wells in October 2003;
- ♦ The wastewater discharged to the New Percolation Ponds is the same wastewater that had been discharged to the old percolation ponds since 1995, and the concentrations of these parameters in the aquifer wells associated with the existing percolation ponds have not exceeded the SCS levels in the past; and
- ♦ Aluminum, iron, and manganese had been detected in the preoperational samples at approximately equal or higher concentrations.

One possible explanation for the elevated levels of aluminum, iron, and manganese may be that both wells were insufficiently developed during construction activities. Another possible explanation is that the annular seals have settled; thus, allowing bentonite slurry to affect the water quality. The sampling logbook entry for October 2003 described the purge water from ICPP-MON-A-167 as murky and the color of bentonite for the entire purge. Before the next sampling event, additional purging will be performed on wells ICPP-MON-A-166 and ICPP-MON-A-167 to try to remove any residual contaminants that may be in the wells as a result of the well construction activities.

During the October 2003 sampling event, an additional filtered (45 micron) sample was collected from wells ICPP-MON-A-166, ICPP-MON-A-167, and ICPP-MON-V-200 and was analyzed for metals. The aluminum, iron, and manganese concentrations in all three wells were significantly less in the filtered samples than in the permit-required unfiltered samples, and all were below the applicable SCSs. Refer to Tables 5-7 and 5-8 for the filtered results. The filters were submitted for additional analysis to try to verify the source of the higher-than-expected aluminum, iron, and manganese concentrations in these three wells. Based on the filter results and further evaluation, corrective actions will be implemented as applicable.





Idaho Nuclear Technology and Engineering Center Sewage Treatment Plant

Description - The INTEC STP treats and disposes of sanitary and other related nonprocess wastes (cafeteria and building water softeners) using natural biological and physical processes (digestion, oxidation, photosynthesis, respiration, aeration, and evaporation). The INTEC STP consists of

- ♦ Three aerated lagoons (Cells 1, 2, and 3);
- ♦ One quiescent, facultative stabilization lagoon (Cell 4);
- ♦ Six control stations; and
- ♦ Four rapid infiltration trenches.

The six control stations direct the wastewater flow to the proper sequence of lagoons and infiltration trenches. Automatic flow-proportional composite samplers are located at control stations CPP-769 (influent) and CPP-773 (wastewater from the STP to the rapid infiltration trenches). The composite samplers collect 24-hour flow-proportional samples as required by the permit.

WLAP Wastewater Monitoring Results - The WLAP sets effluent (CPP-773, wastewater from the STP to the RI trenches) limits for total nitrogen (total kjeldahl nitrogen [TKN] + nitrogen, nitrate [NO₃] + nitrite [NO₂]) and TSS, and requires that the influent and effluent be sampled and analyzed monthly for these and several other parameters. Influent samples were collected from control station CPP-769, and effluent samples were collected from control station CPP-773. The samples were analyzed for the parameters required by Schedule B of the permit. The permit-required data are summarized in Tables 5-9 and 5-10. Except for the monthly total coliform grab sample, all samples are collected as 24-hour flow-proportional composites. All permit-required samples were collected as scheduled.

Monthly average effluent TSS concentrations remained below the permit limit of 100 mg/L, with an annual average of 29.2 mg/L. During 2003, the average monthly total nitrogen exceeded the monthly average limit of 20 mg/L during March and November. The annual average total nitrogen concentration was 14.8 mg/L.

Total annual effluent flow to the trenches was 33.4 million L (8.86 million gal) during 2003, which is well below the permit limit of 78 million L/yr (30 million gal/yr). This total includes estimated flow volumes for periods when the flow meter was out of service.

WLAP Groundwater Monitoring Results - To measure potential INTEC STP impacts to groundwater, the WLAP requires collecting groundwater samples semiannually from three monitoring wells:

- ♦ One background aquifer well (USGS-121) upgradient of INTEC;
- ♦ One perched water well (ICPP-MON-PW-024) immediately adjacent to the STP; and

Table 5-9. INTEC STP influent monitoring results (2003).^{a,b}

Parameter	Minimum	Maximum	Average ^c	Permit Limit
Biological Oxygen Demand (5-day)	121 ^d	879	284	NA ^e
Nitrogen, Nitrate + Nitrite (mg-N/L)	0.031	0.365	0.173	NA
Total Phosphorus	5.1	10.4	6.7	NA
Total Kjeldahl Nitrogen	21.3	73.4	45.3	NA
Total Suspended Solids	55.2 ^f	388.0	201.3	NA

- a. All values are in milligrams per liter (mg/L) unless otherwise noted.
b. Duplicate samples were taken in July and are included in the summaries.
c. Annual average is determined from the average of the monthly values.
d. The minimum shown is from the duplicate sample taken in July 2003.
e. NA—Not applicable; no permit limit is set for this parameter.
f. The minimum shown is from the first sample taken in July 2003.

Table 5-10. INTEC STP effluent monitoring results (2003).^{a,b}

Parameter	Minimum	Maximum	Average ^c	Permit Limit ^d
Biochemical Oxygen Demand (5-day)	4.4	387.0	50.5	NA ^e
Conductivity (µS) (composite)	356	1,045	776	NA
Chloride	69	181	117	NA
Nitrogen, Nitrate + Nitrite (mg-N/L)	0.099	3.00	1.16	NA
Total Phosphorus	2.95 ^f	4.29	3.57	NA
Total Dissolved Solids	296	873	505	NA
Total Kjeldahl Nitrogen	7.7	27.8	13.6	NA
Total Suspended Solids	7.5	69.1	29.2	100
Total Coliform (colonies/100 mL)	50	8,000	2,836	NA
Total Nitrogen ^g	8.8	29.0	14.8	20

- a. All values are in milligrams per liter (mg/L) unless otherwise noted.
b. A duplicate sample were taken in July for all parameters (excluding conductivity and total coliform), and are included in the summaries.
c. Annual average is determined from the average of the monthly values.
d. Effluent limit specified in Section I, Schedule A, Paragraph 1 of the WLAP.
e. NA—Not applicable; no permit limit is set for this parameter.
f. The minimum shown is from the first sample taken in July 2003.
g. Total nitrogen is calculated as the sum of total Kjeldahl nitrogen and nitrate + nitrite.





- ♦ One aquifer well (USGS-052) downgradient of the STP, which serves as the point of compliance.

Sampling must be conducted semiannually (April and October) and includes a list of specified parameters for analysis. Contaminant concentrations in USGS-052 are limited by the PCS and SCS specified in Idaho regulations (IDAPA 58.01.11, "Ground Water Quality Rule"). All permit-required samples are collected as unfiltered samples.

During the 2003 permit year, groundwater samples were collected in April and October. Table 5-11 shows the water levels (collected prior to purging and sampling) and analytical results for all parameters required by the permit. Groundwater samples collected from USGS-052 were in compliance with all permit limits during 2003. Chloride and nitrate concentrations in USGS-052 were elevated compared to USGS-121, as in previous years.

Monitoring well ICPP-MON-PW-024 was completed in the perched water zone approximately 21 m (70 ft) below the surface of the infiltration trenches. It is used as an indicator of treatment efficiency of the soil rather than serving as a point of compliance. As in previous years, TDS and chloride concentrations in ICPP-MON-PW-024 approximated those of the effluent. The October result was above the SCS of 500 mg/L.

Fecal coliform was detected in the October sample from ICPP-MON-PW-024 at 2 col/100 mL. The fecal coliform species identified were *Klebsiella ozanae* and *Escherichia coli*. Total coliform was also identified in the October sample from ICPP-MON-PW-024 at a concentration of 500 colonies/100 mL. The laboratory performing the analysis identified the species of bacteria as *Klebsiella ozanae*.

Fecal coliform consists of various genera and species of coliform bacteria that are specifically associated with human and animal wastes. The treatment processes at the INTEC STP do not include disinfection of the wastewater. Therefore, the source of coliform bacteria found in well ICPP-MON-PW-024 is probably the INTEC STP effluent.

Total nitrogen concentrations (comprised of $\text{NO}_2\text{-N}$, $\text{NO}_3\text{-N}$ and TKN) in the perched water closely followed those of the effluent prior to 1997, the difference being that nearly all the total nitrogen in the perched water was comprised of $\text{NO}_3\text{-N}$, while the effluent was primarily comprised of $\text{NH}_3\text{-N}$. This suggests significant nitrification (a process whereby $\text{NH}_3\text{-N}$ is converted to $\text{NO}_3\text{-N}$) by soil microbes, but little denitrification to a gas. This can be seen in the April 2003 sample from well ICPP-MON-PW-024 where the $\text{NO}_3\text{-N}$ concentration was above the PCS of 10 mg/L.

In March 1997, the trench rotation frequency was increased from biweekly to weekly to increase denitrification in the soil column. The total nitrogen concentrations in the perched water now appear to be reduced compared to that of the effluent, with concentrations generally falling between that of the effluent and that measured at USGS-052. Weekly trench rotation will continue, and concentrations of these parameters will continue to be observed and tracked.

Table 5-11. INTEC STP groundwater monitoring results (2003).^a

ICPP-MON-PW-024 (GW-011502)		USGS-052 (GW-011501)			USGS-121 (GW-011503)		PCS/SCS ^b
Depth to Water Table m (ft)		457.26	457.26	459.32	460.92	460.94	
Sample Date	4/15/2003	4/14/2003	4/14/2003 ^c	10/21/2003	4/15/2003	10/8/2003	
Parameter							
TKN	0.90 U ^d	1.0 U					
Chloride	91.0	139					
TDS	422	569					
NO ₃ -N	10.8	5.8					
NO ₂ -N	0.10 U	0.10 U					
NH ₄ -N	0.10 U	0.10 U					
BOD	3.8	2.0 U					
Total Phosphorus	2.1	2.4					
Total Coliform	Absent	500 ^f					
Fecal Coliform	Absent	2 ^g					
			0.90 U	1.0 U	0.90 U	1.0 U	NA ^e
			31.3	25.8	12.2	12.0	250
			261	254	178	219	500
			3.7	2.7	0.70	0.70	10
			0.10 U	0.10 U	0.10 U	0.10 U	1
			0.10 U	0.10 U	0.10 U	0.10 U	NA
			2.5	2.0 U	3.0	2.0 U	NA
			0.068	0.10 U	0.077	0.10 U	NA
			Absent	Absent	Absent	Absent	1 colony/100 mL
			Absent	Absent	Absent	Absent	NA

a. All concentrations are in milligrams per liter (mg/L), except pH, which is in standard units.

b. Primary constituent standards (PCS) and secondary constituent standards (SCS) in groundwater referenced in IDAPA 58.01.11.200.01.a and b.

c. Duplicate sample.

d. U flag indicates that the result was reported as below the detection limit.

e. NA = Not applicable.

f. *Klebsiella ozanae* was speciated in this sample.

g. *Klebsiella ozanae* and *Escherichia coli* were speciated in this sample.





Test Area North/Technical Support Facility Sewage Treatment Plant

Description - The TAN/TSF STP (TAN-623) was constructed in 1956. It was designed to treat raw wastewater by biologically digesting the majority of the organic waste and other major contaminants, then applying it to the land surface for infiltration and evaporation. The STP consists of

- ♦ A wastewater-collection manhole;
- ♦ An Imhoff tank;
- ♦ Sludge drying beds;
- ♦ A trickle filter and settling tank;
- ♦ A contact basin (currently not in use); and
- ♦ An infiltration disposal pond.

The TAN/TSF Disposal Pond was constructed in 1971; prior to that, treated wastewater was disposed of through an injection well. The Disposal Pond consists of a primary disposal area and an overflow section, both of which are located within an unlined, fenced 14.2-ha (35-acre) area. The overflow pond is used only when wastewater is diverted to it for brief periods of cleanup and maintenance of the primary pond. In addition to receiving treated sewage wastewater, the TAN/TSF Disposal Pond also receives process wastewater, which enters the facility at the TAN-655 lift station.

The TSF sewage primarily consists of spent water containing wastes from restrooms, sinks, and showers. The sanitary wastewater goes to the TAN-623 STP, and then to the TAN-655 lift station, which pumps to the TAN/TSF Disposal Pond.

The process drain system collects wastewater from process drains and building sources originating from various TAN facilities. The process wastewater consists of liquid effluent, such as steam condensate; water softener and demineralizer discharges; cooling water; heating, ventilating, and air conditioning; and air scrubber discharges. The process wastewater is transported directly to the TAN-655 lift station, where it is mixed with sanitary wastewater before being pumped to the TAN/TSF Disposal Pond.

WLAP Wastewater Monitoring Results - The permit flow limit is 129 million L/yr (34 million gal/yr) discharged to the TAN/TSF Disposal Pond. Total effluent to the TAN/TSF Disposal Pond for calendar year 2003 was approximately 39.4 million L (10.42 million gal). This total includes estimated flow volumes for periods when the flow meter was out of service.

The permit for the TAN/TSF STP also sets concentration limits for TSS and total nitrogen measured in the effluent to the TAN/TSF Disposal Pond and requires that the effluent be sampled and analyzed monthly for several parameters. During 2003, 24-hr composite samples (except fecal and total coliform, which were grab samples) were collected from the TAN-655 lift station effluent monthly.

Table 5-12 summarizes the effluent monitoring results for calendar year 2003. Monthly concentrations of TSS were well below the permit limit (100 mg/L) throughout the entire year, with an annual average of 9.21 mg/L. All monthly total nitrogen (TKN + nitrogen, nitrite+nitrate) concentrations were well below the permit limit of 20 mg/L, with the maximum monthly concentration of 11.11 mg/L reported in June.

WLAP Groundwater Monitoring Results - To measure potential TAN/TSF Disposal Pond impacts to groundwater, the WLAP for the TAN/TSF STP requires collecting groundwater samples semiannually from four monitoring wells:

- ♦ One background aquifer well (TANT-MON-A-001) upgradient of the TAN/TSF Disposal Pond; and
- ♦ Three aquifer wells (TAN-10A, TAN-13A, and TANT-MON-A-002) that serve as permit points of compliance.

Sampling must be conducted semiannually and includes several specified parameters for analysis. Contaminant concentrations in TAN-10A, TAN-13A, and TANT-MON-A-002 are limited by the permit to the PCS and SCS levels in IDAPA 58.01.11, "Ground Water Quality Rule." All permit required samples are collected as unfiltered samples.

During the 2003 permit year, groundwater samples were collected in April and October. Table 5-13 shows water levels (recorded prior to purging and sampling) and analytical results for all parameters specified by the permit. Iron concentrations exceeded the SCS of 0.3 mg/L in TAN-10A in April and October. Iron concentrations in additional filtered samples collected in April and October 2003 from TAN-10A also exceeded the SCS. Elevated iron concentrations historically have been detected in the TAN WLAP monitoring wells.

Video log information gathered on all four WLAP wells showed that the carbon-steel well casing in well TAN-10A appeared to be corroded most of the way to the water table. In August 2001, to address the elevated iron concentration in all four TAN WLAP monitoring wells, the riser pipes attached to the dedicated submersible pumps were replaced with stainless steel riser pipes. Based on samples collected prior to the maintenance and those collected after the maintenance, iron concentrations in three of the WLAP monitoring wells have decreased. However, the iron concentrations in TAN-10A increased after the maintenance and were above the SCS in 2003. The condition of the well casing, coupled with the residual effects relating to the replacement of the galvanized riser pipe, may have resulted in the iron concentrations exceeding the SCS in TAN-10A during 2003.

Total coliform was identified in TANT-MON-A-001 (background well), TANT-MON-A-002 (compliance well), and TAN-13A (compliance well) above the PCS of one colony/100 mL in the October 2003 sample. The total coliform in wells TANT-MON-A-001, TANT-MON-A-002, and TAN-13A were four colonies/100 mL, 17 colonies/100 mL (26 colonies/100 mL, duplicate), and 72 colonies/100 mL, respectively. The coliform species identified by the laboratory was *Hafnia alvei* in wells TANT-MON-A-001 and TANT-MON-A-002. Two coliform species, *Hafnia alvei* and *Serratia marcescens* were identified in well TAN-13A.



Table 5-12. TAN/TSF STP effluent annual monitoring results (2003).^{a,b}

Parameter	Minimum	Maximum	Average ^c	Permit Limit ^d
Biological Oxygen Demand (5-day)	7.2	47.5	14.5	NA ^e
Chloride	19.3	245.0	91.1	NA
Fluoride	0.10 ^f	0.34	0.24	NA
Nitrogen, as Ammonia	0.05	2.49	0.96	NA
Nitrogen, Nitrate + Nitrite (mg-N/L)	2.65	5.07	3.82	NA
Total Kjeldahl Nitrogen	2.0	8.0	3.4	NA
Total Nitrogen ^g	4.76	11.11	7.23	20
Total Phosphorus	0.207	0.849	0.601	NA
Sulfate	35.6	52.1	39.6	NA
Total Dissolved Solids	260	962	418	NA
Total Suspended Solids	2.0 ^f	29.3	9.21	100
Arsenic	0.0013 ^f	0.0054	0.0024	NA
Barium	0.091	0.114	0.098	NA
Chromium	0.0013 ^f	0.004	0.0028	NA
Iron	0.091	0.370	0.159	NA
Lead	0.0002 ^f	0.0036	0.0009	NA
Manganese	0.003	0.012	0.005	NA
Mercury	0.0001 ^f	0.0001 ^f	0.0001 ^h	NA
Selenium	0.0008 ⁱ	0.0026 ^j	0.0010	NA
Sodium	8.7	157.0	59.9	NA
Zinc	0.022	0.040	0.030	NA
Fecal Coliform (colonies/100 mL)	5,000	79,000	40,633	NA
Total Coliform (colonies/100 mL)	53,000	160,000	89,333	NA

a. All values are in milligrams per liter (mg/L) unless otherwise noted.

b. Duplicate samples were taken in January for all parameters (excluding fecal and total coliform) and are included in the summaries.

c. Annual average is determined from the average of the monthly values. Half the reported detection limit was used in the yearly average calculation for those data reported as below the detection limit.

d. Effluent limit specified in Section I, Schedule A, Paragraph 1 of the WLAP.

e. NA—Not applicable; no permit limit is set for this parameter.

f. Sample result was less than the detection limit; value shown is half the detection limit.

g. Total nitrogen is calculated as the sum of total Kjeldahl nitrogen and nitrate + nitrite.

h. All data were reported as less than the detection limit. Therefore, the average is based on half the reported detection limit for each of the monthly values.

i. The minimum shown is from the duplicate sample taken in January. It represents the minimum of the detected results and of the reported detection limits (for those results during the year that were reported as less than the detection limit).


j. The maximum shown is from the first sample taken in January.

Table 5-13. TAN/TSF STP groundwater monitoring results (2003).

Depth to Water Table m (ft)	TANT-MON-A-001 (GW-015301)		TANT-MON-A-002 (GW-015304)				TAN-10A (GW-015303)		TAN-13A (GW-015302)		PCS/SCS ^a
	206.31	207.96	210.73	210.73	211.41	211.41	206.93	209.79	209.35	209.05	
Sample Date Parameter ^b	4/21/2003	10/14/2003	4/21/2003	4/21/2003 ^c	10/14/2003	10/14/2003 ^c	4/16/2003	10/1/2003	4/16/2003	10/1/2003	
TKN	0.90 U ^d	2.2	1.8 U	1.8 U	2.0	1.7	1.8 U	1.0 U	0.90 U	1.0 U	NA ^e
BOD	2.9	2.0 U	2.6	2.8	2.0 U	2.0 U	3.1	2.0 U	2.0 U	2.0 U	NA
Chloride	121	10.9	3.6	3.1	3.3	3.2	101	99.6	7.2	3.2	250
TDS	248	225	225	216	196	188	424	479	147	95	500
Total Phosphorus	0.084	0.12	0.030 U	0.084	0.10 U	0.10 U	0.21	0.10 U	0.030 U	0.50 U	NA
Sodium	7.56	7.14	5.49	5.56	5.87	5.83	51.9	48.6	5.63	5.54	NA
NO ₃ -N	0.83	0.79	0.48	0.51	0.50	0.52	1.1	0.83	0.40	0.40	10
NO ₂ -N	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	1
NH ₄ -N	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	NA
Arsenic	0.0025 U	0.0027	0.0027	0.0025 U	0.0027	0.0038	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.05
Barium	0.0806	0.078	0.0800	0.0796	0.0773	0.0769	0.241	0.242	0.0752	0.0748	2
Chromium	0.0043	0.0042	0.0089	0.0057	0.0079	0.0064	0.0025 U	0.0025 U	0.0044	0.0058	0.1
Mercury	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.002
Selenium	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.05
Fluoride	0.16	0.17	0.18	0.19	0.16	0.12	0.11	0.17	0.18	0.21	4
Iron	0.0356	0.0538	0.172	0.158	0.0935	0.0777	0.433	1.07	0.0387	0.0932	0.3
Iron (filtered)	—	—	—	—	—	—	0.347	0.918	0.025 U	0.0427	0.3
Lead	0.0015 U	0.0015 U	0.0015 U	0.0015 U	0.0015 U	0.0015 U	0.0015 U	0.0015 U	0.0015 U	0.0015 U	0.015
Manganese	0.0025 U	0.0025 U	0.0039	0.0034	0.0025 U	0.0025 U	0.0082	0.0111	0.0025 U	0.0025 U	0.05
Sulfate	32.8	30.8	13.3	13.4	14.0	13.6	39.6	39.5	14.2	13.8	250
Zinc	0.0506	0.0398	0.201	0.188	0.107	0.103	0.0291	0.0226	0.171	0.174	5
Total Coliform	Absent	4 ^f	Absent	Absent	17 ^f	26 ^f	Absent	Absent	Absent	72 ^g	1 colony/ 100 mL
Fecal Coliform	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	NA

a. Primary constituent standards (PCS) and secondary constituent standards (SCS) in groundwater referenced in IDAPA 58.01.11.200.01.a and b.
b. All concentrations are in milligrams per liter (mg/L), except total and fecal coliform, which are colonies per 100 mL.
c. Duplicate sample.
d. U flag indicates that the result was reported as below the detection limit.
e. NA = Not applicable.
f. *Hafnia alvei* was speciated in this sample.
g. *Hafnia alvei* and *Serratia marcescens* were speciated in this sample.





The TAN/TSF Disposal Pond effluent contains total coliform bacteria; however, it is unlikely the coliform detected in wells TANT-MON-A-001 and TANT-MON-A-002 was the result of the Disposal Pond effluent. TANT-MON-A-001 is the background well and is not influenced by the Disposal Pond. TANT-MON-A-002 is west/southwest of the Disposal Pond, and groundwater flows at TAN are primarily to the south or southeast; therefore, it is unlikely that bacteria could be transported into the well without significant transverse dispersivity in the vadose zone.

For well TAN-13A, the October 2003 detection is the first time coliform bacteria has been detected since 1996. Because well TAN-13A is located southeast of the Disposal Pond, it is possible that the coliform in the effluent discharged to the pond has affected this well. However, fecal coliform is also present in the effluent but was not detected in TAN-13A in 2003.

There are many possible sources for the total coliform detected in the samples from these three wells. Further evaluation will be required to try to identify the specific source of the coliform contamination. If the source can be identified, appropriate corrective actions can be taken.

Test Reactor Area Cold Waste Pond

Description - The TRA Cold Waste Pond was constructed in 1982. The effluent to the Cold Waste Pond receives a combination of process water from various TRA facilities. The majority of wastewater received by the Cold Waste Pond is secondary cooling water from the Advanced Test Reactor when it is in operation. Chemicals used in the cooling water are primarily commercial corrosion inhibitors and sulfuric acid to control pH. Other wastewater discharges to the Cold Waste Pond are nonhazardous and nonradioactive and include, but are not limited to: maintenance cleaning waste, floor drains, and yard drains.

The cold waste effluents collect at the cold well sump and sampling station (TRA-764) before being pumped to the Cold Waste Pond. The cooling tower system has a radiation monitor with an alarm that prevents accidental discharges of radiologically contaminated cooling water.

WLAP Wastewater Monitoring Results - A letter from the Idaho DEQ issued in 2001, authorized the continued operation of the Cold Waste Pond under the terms and conditions of the WLAP regulations (Johnston 2001). As a result, total nitrogen (TKN + nitrogen, nitrite+nitrate) and TSS analyses were added in August 2001 to the list of parameters analyzed quarterly at the Cold Waste Pond. These are the only parameters required for compliance. Other parameters are sampled for surveillance purposes, which are discussed in Section 5.3.

Automated samplers are used to collect quarterly 24-hour time-proportional composite samples from TRA-764. TSS and total nitrogen results are summarized in Table 5-14. Additional monitoring for surveillance parameters is discussed in the next section. The 2003 annual average for TSS was 3.3 mg/L with a maximum concentration of 7.3 mg/L. These levels are well below the regulatory limit of 100 mg/L. The maximum total nitrogen concentration during 2003 was 5.05 mg/L, and it was also significantly less than the regulatory limit of 20 mg/L.

WLAP Groundwater Monitoring Results - Currently, there are no groundwater monitoring requirements associated with the TRA Cold Waste Pond. However, groundwater monitoring is expected to be required when a permit is issued.

Table 5-14. TRA Cold Waste Pond effluent monitoring results (2003).^{a,b}

Parameter	Minimum	Maximum	Average^c	Permit Limit^d
Total Suspended Solids	2.0	7.3	3.3	100
Total Nitrogen ^e	1.10 ^f	5.05	3.30	20

a. All values are in milligrams per liter (mg/L).

b. Duplicate samples were taken in October 2003 for both parameters and are included in the summaries.

c. Annual average is determined from the average of the quarterly values. Half the reported detection limit was used in the yearly average calculation for those data reported as below the detection limit.

d. Effluent limit specified in IDAPA 58.01.17.600.06.B, Wastewater Land Application Permit Rules.

e. Total nitrogen is calculated as the sum of total Kjeldahl nitrogen and nitrate + nitrite.

f. The minimum shown is from the duplicate sample taken in October 2003.

5.3 Liquid Effluent Surveillance Monitoring

As stated in Section 5.2, additional radiological and nonradiological parameters specified in the Idaho groundwater quality standards also are monitored. The results of this additional monitoring are discussed by individual facility in the following sections. This additional monitoring is performed to comply with DOE Order 450.1 and 5400.5 environmental protection objectives.

Argonne National Laboratory-West

During 2003, the Industrial Waste Pond, Industrial Waste Ditch, and Secondary Sanitary Lagoon at ANL-W were monitored monthly for iron, sodium, chloride, fluoride, sulfate, pH, conductivity, TSS, turbidity, biological oxygen demand, gross alpha, gross beta, gamma spectrometry, and tritium. Additionally, the Secondary Sanitary Lagoon was also monitored monthly for total coliform. All chemical parameters for both ponds and the waste ditch were well below applicable limits (Table 5-15).

Central Facilities Area

Both the influent and effluent to the CFA STP are monitored according to the WLAP issued for the plant. Table 5-16 summarizes the additional monitoring conducted during 2003 at the CFA STP and shows those parameters with at least one detected result during the year. Additional monitoring is performed quarterly from the floor drains and vehicle maintenance areas of the Transportation Complex at CFA-696. During 2003, no applicable limits were exceeded for any of the additional parameters monitored, and all additional parameters were within historical concentration levels.



Table 5-15. ANL-W industrial and Sanitary Waste Pond effluent monitoring results (2003).

Parameter	Industrial Waste Pond			Industrial Waste Ditch			Sanitary Waste Pond		
	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
Iron ^a	0.10	1.14	0.41	0.10	0.44	0.18	0.10	0.35	0.18
Mercury	5.2 x 10 ⁻⁵	0.007	0.0061	5.2 x 10 ⁻⁵	0.007	0.0061	— ^b	—	—
Sodium	31.3	65.8	47.31	20	66	29.41	62.60	316.00	226.37
Chloride	28	63	40.14	26	59	35.00	190	430	309.14
Fluoride	1	1	1.04	1	1	1.00	1	1	1.00
Phosphate	1	2	1.14	1	1	1.00	1	28	12.06
Sulfate	21	33	25.29	14	33	21.70	58	111.29	66
Gross alpha ^c	5.2	200	56.83	5.2	200	79.72	5.2	200	68.28
Gross beta	12	200	85.83	13	200	61.67	40	200	87.50
Gross gamma	0	0	0.00	0	0	0.00	0	0	0.00
Tritium	3,200	3,600	3,333.33	3,200	3,600	3,266.67	3,200	3,600	3,300.00
pH ^d	7.59	9.05	8.40	7.19	9.18	7.95	6.56	8.84	7.31

a. Values of iron through sulfate are in milligrams per liter (mg/L).

b. — = constituent not analyzed.

c. Radiological values are in picocuries per liter (pCi/L).

d. pH values are in standard units.

Idaho Nuclear Technology and Engineering Center

Wastewater Land Application Permits exist for the STP and the New Percolation Ponds at the INTEC. Table 5-17 summarizes the additional monitoring conducted during 2003 at INTEC and shows those parameters with at least one detected result during the year.

For the INTEC STP, none of the additional parameters exceeded applicable limits. No additional parameters were analyzed for at the New Percolation Ponds beyond those required by the permit.

Naval Reactors Facility

Liquid effluent monitoring confirmed all discharges to the industrial waste ditch in 2003 were controlled in accordance with applicable federal and State laws. No detections above these limits were seen. Specifics regarding this monitoring are published in the *2003 Environmental Monitoring Report for the Naval Reactors Facility* (Bechtel Bettis 2003).

Test Area North

The effluent to the TAN/TSF Disposal Pond receives a combination of process water from various TAN facilities and treated sewage waste. Additional monitoring for surveillance purposes

Table 5-16. CFA liquid effluent surveillance monitoring results (2003).^{a,b}

Parameter	Minimum	Maximum	Average ^c	Permit Limit
Influent to CFA Sewage Treatment Plant Pond 1				
Conductivity (µS) (grab)	854	1,201	973	NA
Total Phosphorus	1.26	5.51	2.33	NA
Effluent from CFA Sewage Treatment Plant to Pivot Irrigation System				
Conductivity (µS) (grab)	1,418	1,749	1,568	NA
Chloride	373	373	373	NA
Fluoride	0.343	0.343	0.343	NA
Sulfate	57.7	57.7	57.7	NA
Total Dissolved Solids	746	746	746	NA
Aluminum	0.051	0.051	0.051	NA
Antimony	0.00065	0.00065	0.00065	
Arsenic	0.0034	0.0034	0.0034	
Barium	0.099	0.099	0.099	NA
Copper	0.004	0.004	0.004	NA
Iron	0.0754	0.0754	0.0754	
Manganese	0.007	0.007	0.007	NA
Sodium	158	158	158	NA
Zinc	0.005	0.005	0.005	NA
Gross Beta ^d	7.47 ± 2.32	7.47 ± 2.32	7.47 ± 2.32	NA
Tritium ^d	7,670 ± 372	7,670 ± 372	7,670 ± 372	NA
Iodine-129 ^d	0.316 ± 0.14	0.316 ± .14	0.316 ± 0.14	NA
Transportation Complex, CFA-696				
pH (standard units) (grab)	7.51	7.93	7.81	NA
Conductivity (µS) (grab)	601	951	729	NA
Total Oil and Grease	5.14	30.70	14.44	NA
<p>a. Only parameters with at least one detected result are shown.</p> <p>b. All values are in milligrams per liter (mg/L) unless otherwise noted.</p> <p>c. Radiological average calculations are weighted by uncertainty.</p> <p>d. Radiological values are in picocuries per liter (pCi/L), plus or minus the uncertainty (two standard deviations).</p>				

is conducted monthly for metal parameters and quarterly for radiological parameters (with the exception of strontium-89 (⁸⁹Sr), strontium-90 (⁹⁰Sr), iodine-129 (¹²⁹I) and tritium, which are monitored annually). Table 5-18 summarizes the results of this additional monitoring for those parameters with at least one detected result. During 2003, the concentrations of the additional parameters were below applicable limits and within historical concentration levels.



Table 5-17. INTEC liquid effluent surveillance monitoring results (2003).^{a,b}

Parameter	Minimum	Maximum	Average ^c	Permit Limit
Influent to INTEC Sewage Treatment Plant				
Conductivity (µS)	702	1,125	886	NA
pH (standard units)	8.18	8.71	8.50	NA
Effluent from INTEC Sewage Treatment Plant				
pH (standard units) (grab)	7.85	8.99	8.55	NA
Conductivity (µS) (grab)	604	1,078	819	NA
Sulfate	40.60	40.60	40.60	NA
Aluminum	0.052	0.052	0.052	NA
Barium	0.121	0.121	0.121	NA
Copper	0.004	0.004	0.004	NA
Iron	0.182	0.182	0.182	NA
Manganese	0.020	0.020	0.020	NA
Sodium	72.80	72.80	72.80	NA
Zinc	0.013	0.013	0.013	NA
Gross Alpha ^d	-0.40 ± 1.62 ^e	2.35 ± 1.66	0.81 ± 0.65	NA
Gross Beta ^d	4.69 ± 1.26	18.40 ± 2.82	8.23 ± 0.89	NA
Iodine-129 ^d	0.10 ± 0.06	0.10 ± 0.06	0.10 ± 0.06	NA

a. Only parameters with at least one detected result are shown.

b. All values are in milligrams per liter (mg/L) unless otherwise noted.

c. Radiological average calculations are weighted by uncertainty.

d. Radiological values are in picocuries per liter (pCi/L), plus or minus the uncertainty (two standard deviations)

e. Result was a statistical nondetect.

Table 5-18. TAN liquid effluent surveillance monitoring results (2003).^{a,b}

Parameter	Minimum	Maximum	Average ^c	Permit Limit
Effluent to TAN/TSF Disposal Pond				
Conductivity (µS) (grab)	423	1,385	760	NA
pH (standard units) (grab)	7.57	9.31	8.25	NA
Aluminum	0.0125 ^d	0.051	0.027	NA
Antimony	0.0003 ^d	0.0006	0.0004	NA
Copper	0.003	0.057	0.013	NA
Gross Alpha ^e	0.80 ± 1.21 ^f	3.28 ± 1.64	1.60 ± 0.83	NA
Gross Beta ^e	3.32 ± 1.29	18.80 ± 1.65	10.27 ± 0.75	NA
Strontium-89 ^e	1.73 ± 0.13	1.73 ± 0.13	1.73 ± 0.13	NA
Strontium-90 ^e	1.69 ± 0.46	8.30 ± 1.18	2.82 ± 0.41	NA

a. Only parameters with at least one detected result are shown.

b. All values are in milligrams per liter (mg/L) unless otherwise noted.

c. Radiological average calculations are weighted by uncertainty.

d. Sample result was less than the detection limit; value shown is half the detection limit.

e. Radionuclide values are in picocuries per liter (pCi/L), plus or minus the uncertainty (two standard deviations).

f. Result was a statistical nondetect.

Test Reactor Area

Additional monitoring for surveillance purposes is conducted quarterly for metal and radiological parameters. Table 5-19 summarizes the results of this additional monitoring for those parameters with at least one detected result. During 2003, the concentrations of the additional parameters were within historical levels.

The largest volume of wastewater received by the TRA Cold Waste Pond is secondary cooling water from the Advanced Test Reactor when it is in operation. During 2003, concentrations of sulfate and TDS were elevated in samples collected during reactor operation. These differences are due to the normal raw water hardness, as well as corrosion inhibitors and sulfuric acid added to control the cooling water pH. Concentrations of sulfate and TDS exceeded the risk-based release levels specific for the TRA Cold Waste Pond during reactor operation but not during reactor outages. The annual average was below the risk-based release limit, which is the concentration predicted to degrade groundwater quality to above drinking water standards.

Table 5-19. TRA effluent surveillance monitoring results (2003).^{a,b}

Parameter	Minimum	Maximum	Average ^c	Permit Limit
Effluent from TRA Cold Waste Pond				
Conductivity (µS) (grab)	414	1,098	743	NA
pH (standard units) (grab)	7.78	8.00	7.90	NA
Chloride	10.30	30.60	22.60	NA
Fluoride	0.100 ^d	0.343	0.219	NA
Nitrogen, Nitrate+Nitrite (mg-N/L)	1.02	2.78	1.89	NA
Sulfate	31.80	425	224.15	NA
Total Dissolved Solids	257	821	498	NA
Total Kjeldahl Nitrogen	0.160	3.97	1.404	NA
Antimony	0.0003 ^d	0.001	0.0005	
Arsenic	0.0015 ^d	0.004	0.003	NA
Barium	0.050	0.126	0.087	NA
Chromium	0.003	0.008	0.006	NA
Copper	0.002	0.010	0.004	NA
Iron	0.0125 ^d	0.103	0.075	NA
Selenium	0.001 ^d	0.004	0.002	
Sodium	8.08	27.90	18.05	NA
Zinc	0.0015 ^d	0.010	0.005	NA
Gross Alpha ^e	2.10 ± 1.13	4.00 ± 1.95	2.55 ± 0.82	NA
Gross Beta ^e	0.86 ± 1.64 ^f	9.07 ± 2.20	4.61 ± 0.54	NA

a. Only parameters with at least one detected result are shown.

b. All values are in milligrams per liter (mg/L) unless otherwise noted.

c. Radiological average calculations are weighted by uncertainty.

d. Sample result was less than the detection limit; value shown is half the detection limit.

e. Radiological values are in picocuries per liter (pCi/L), plus or minus the uncertainty (two standard deviations).

f. Result was a statistical non-detect.





5.4 Drinking Water Monitoring

In 1988, a centralized drinking water program was established. Each contractor (BBWI, ANL-W and NRF) participates in the INEEL Drinking Water Program. However, each contractor administers their own drinking water program.

The Drinking Water Program was established to monitor drinking water and production wells, which are multiple-use wells for industrial use, fire safety, and drinking water. According to the "Idaho Regulations for Public Drinking Water Systems" (IDAPA 58.01.08), INEEL drinking water systems are classified as either nontransient or transient, noncommunity water systems. The M&O contractor transient, noncommunity water systems are at the Experimental Breeder Reactor No. 1 (EBR-I), the Gun Range, and the Main Gate. The rest of the M&O contractor water systems are classified as nontransient, noncommunity water systems, which have more stringent requirements than transient, noncommunity water systems.

The Drinking Water Program monitors drinking water to ensure it is safe for consumption and to demonstrate that it meets Federal and State regulations (that MCLs are not exceeded). The Federal *Safe Drinking Water Act* also establishes requirements for the Drinking Water Program.

Because groundwater supplies the drinking water at the INEEL, information on groundwater quality was used to help develop the Drinking Water Program. The U.S. Geological Survey (USGS) and the various contractors monitor and characterize groundwater quality at the INEEL. Three groundwater contaminants have impacted M&O contractor drinking water systems: tritium at CFA, carbon tetrachloride at the Radioactive Waste Management Complex (RWMC), and trichloroethylene at TAN/TSF.

As required by the state of Idaho, the Drinking Water Program uses EPA-approved (or equivalent) analytical methods to analyze drinking water in compliance with current editions of IDAPA 58.01.08 and Title 40 Code of Federal Regulations (CFR) Parts 141-143 (40 CFR 141-143 2003). State regulations also require the use of laboratories that are certified by the state of Idaho or certified by another state whose certification is recognized by the state of Idaho for their drinking water analyses. The State Department of Environmental Quality oversees the certification program and maintains a listing of approved laboratories.

Currently, the M&O contractor Drinking Water Program monitors 10 onsite water systems, which include 17 wells. Drinking water parameters are regulated by the state of Idaho under authority of the *Safe Drinking Water Act*. Parameters with primary maximum contaminant levels must be monitored at least once during every three-year compliance period. Parameters with secondary maximum contaminant levels are monitored every three years based on a recommendation by the EPA. The three year compliance periods for the M&O contractor Drinking Water Program are 2002 to 2004, 2005 to 2007, and so on. Many parameters require more frequent sampling during an initial period to establish a baseline, and subsequent monitoring frequency is determined from the baseline.

Because of known contaminants, the M&O contractor Drinking Water Program monitors certain parameters more frequently than required. For example, the program monitors for bacteriological analyses more frequently because of historical problems with bacteriological

contamination. These past detections were most probably caused by biofilm on older water lines and stagnant water, because resampling results were normally in compliance with the MCL.

M&O Contractor Drinking Water Monitoring Results

During 2003, 389 routine samples and 53 quality control samples were collected and analyzed from CFA, EBR-I, Gun Range (Live-Fire Test Range), INTEC, Main Gate, Power Burst Facility (PBF), RWMC, TAN/Contained Test Facility (CTF), TAN/TSF, and TRA. In addition to the routine sampling, the M&O contractor Drinking Water Program also collects nonroutine samples. For example, a nonroutine sample is one collected after a water main breaks and is repaired to determine if the water is acceptable for use before the main is put back into service. The M&O contractor Drinking Water Program received 48 requests for nonroutine sampling during 2003.

Analytical results of interest for 2003, exceedances, and nitrate (required to be monitored annually) results are presented in Tables 5-20 through 5-22, respectively, and are discussed in the following subsections. EBR-I, Gun Range, INTEC, Main Gate, PBF, and TAN/CTF were well below drinking water limits for all regulatory parameters; therefore, they are not discussed further in this report.

In 2003, total coliform and fecal coliform bacteria were absent in all M&O contractor-operated water systems at the INEEL, except for TRA. Total coliform was detected in September 2003 at TRA because the disinfection system was out of service. After the disinfection system was repaired and the water system was disinfected and returned to service, no coliform bacteria were detected. No other MCL exceedances occurred during 2003 for any parameter.

Table 5-20. Monitored parameters of interest in 2003.

Parameter^a	Location	Results^b	MCL^b
Carbon Tetrachloride	RWMC Distribution	2.80	5
	RWMC Well ^c	4.57	NA ^d
Trichloroethylene	RWMC Distribution	1.60	5
	RWMC Well ^c	2.30	NA
	TAN/TSF Distribution	1.20	5
	TAN/TSF #2 Well ^c	2.50	NA
Tritium	CFA Distribution	9,276 ± 253	20,000
	CFA #1 Well ^c	9,283 ± 304 ^e	NA
	CFA #2 Well ^c	8,244 ± 343 ^e	NA

a. The parameters shown are known contaminants that the Drinking Water Program is tracking.

b. Results and maximum contaminant levels are in micrograms per liter (µg/L). Tritium is in picocuries per liter (pCi/L).

c. Sampled for surveillance purposes (not required by regulations to be sampled). The compliance point is the distribution system.

d. NA = Maximum contaminant level is not applicable to the well concentration.

e. Result is based on a two quarters of sampling.



Table 5-21. Monitored parameter exceedences in 2003.

Parameter ^a	Location	Results	MCL
Total Coliform	TRA Distribution	Present	Absent

a. Total coliform was detected in the TRA distribution system in September 2003.

Table 5-22. Nitrate results for M&O contractor and ANL-W water systems in 2003.

Water System	PWS Number	Parameter	Concentration ^a	MCL ^a
ANL-W	6060036	Nitrate as nitrogen	1.53	10
CFA	6120008	Nitrate as nitrogen	2.70	10
INTEC	6120012	Nitrate as nitrogen	0.70	10
EBR-I	6120013	Nitrate as nitrogen	0.34	10
Gun Range	6120009	Nitrate as nitrogen	0.81	10
Main Gate	6120035	Nitrate as nitrogen	0.59	10
PBF	6120015	Nitrate as nitrogen	0.84	10
RWMC	6120019	Nitrate as nitrogen	0.75	10
TAN/CTF	6120018	Nitrate as nitrogen	0.87	10
TAN/TSF	6120030	Nitrate as nitrogen	0.80	10
TRA	6120031	Nitrate as nitrogen	0.79	10

a. Concentration and MCL are in milligrams per liter (mg/L).

Central Facilities Area - The CFA water system serves approximately 850 people daily. Since the early 1950s, wastewater containing tritium was disposed to the Snake River Plain Aquifer (SRPA) at INTEC and TRA through injection wells and infiltration ponds. These wastewaters migrated south southwest and are the suspected source of tritium contamination in the CFA water supply wells. The practice of disposing of wastewater through injection wells was discontinued in the mid-1980s.

In 2003, water samples were collected quarterly from CFA 1 Well (at CFA-651), CFA 2 Well (at CFA-642), and CFA-1603 (point of entry to the distribution system) for compliance purposes. Since December 1991, the mean tritium concentration has been below the MCL at all three locations. In general, tritium concentrations in groundwater have been decreasing (Figure 5-1) because of changes in disposal rates, disposal techniques, recharge conditions, and radioactive decay.

CFA Worker Dose - Because of the potential impacts to down-gradient workers at CFA from radionuclides in the SRPA, the potential effective dose equivalent from radioactivity in water was calculated. CFA was selected because tritium concentrations found in these wells were the

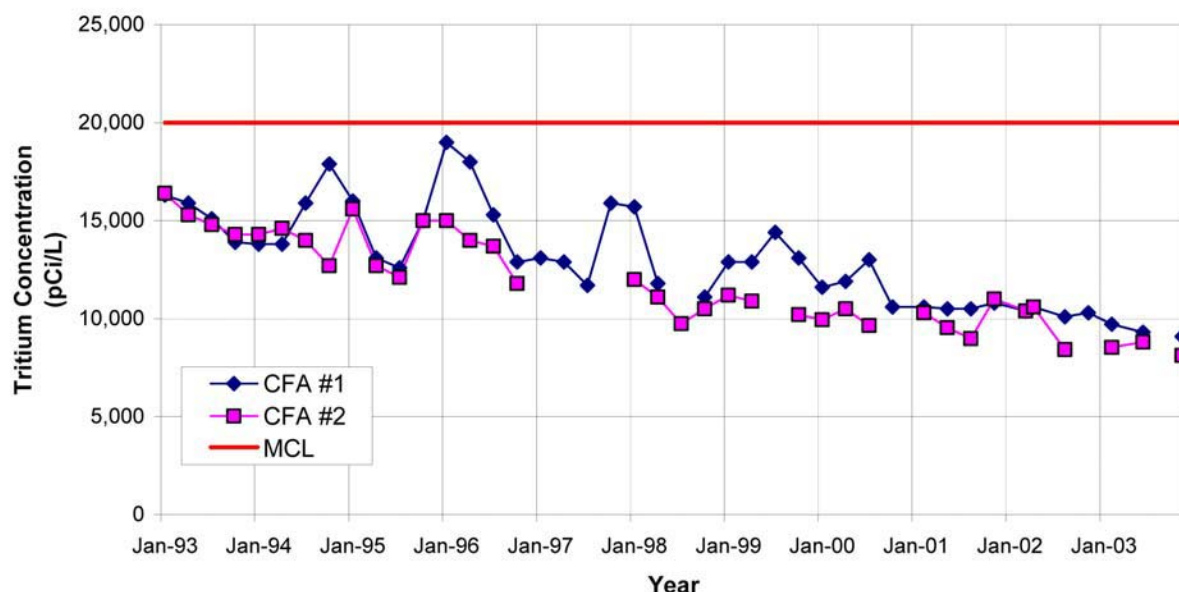


Figure 5-1. Tritium concentrations in two wells and two distribution systems at the INEEL (1993-2003).

highest of any drinking water wells. The 2003 calculation was based on

- ♦ Mean tritium concentration for the CFA distribution system in 2003;
- ♦ Water usage information for 2003 showing CFA 1 was used for approximately 50 percent of the drinking water and CFA 2 for 50 percent of the drinking water; and
- ♦ Data from a 1990-1991 USGS study for ^{129}I using the accelerator mass spectrographic analytical technique that indicated water from both CFA 1 and CFA 2 had measurable concentrations of ^{129}I . The average (four samples) concentration for ^{129}I for the CFA distribution system was 0.28 ± 0.03 pCi/L for 2003. For perspective, the EPA drinking water standard for ^{129}I is 1 pCi/L.

For the 2003 dose calculation, the assumption was made that each worker's total water intake came from the CFA drinking water distribution system. This assumption overestimates the dose because workers typically consume only about half their total intake during working hours and typically work only 240 days rather than 365 days per year. The estimated annual effective dose equivalent to a worker from consuming all their drinking water at CFA during 2003 was 0.88 mrem (8.8 μSv), below the EPA standard of 4 mrem/yr for public drinking water systems.

Radioactive Waste Management Complex - Various solid and liquid radioactive and chemical wastes, including transuranic wastes, have been disposed at the RWMC. The RWMC contains pits, trenches, and vaults where radioactive and organic wastes were disposed below grade, as well as placed above grade on a large pad and covered. During an INEEL-wide characterization program conducted by USGS, carbon tetrachloride and other volatile organic





compounds were detected in groundwater samples taken at the RWMC (Lewis and Jensen 1984). Review of waste disposal records indicated an estimated 334,630 L (88,400 gal) of organic chemical wastes (including carbon tetrachloride, trichloroethylene, tetrachloroethylene, toluene, benzene, 1,1,1-trichloroethane, and lubricating oil) were disposed at the RWMC before 1970. High vapor-phase concentrations (up to 2700 parts per million vapor phase) of volatile organic compounds were measured in the zone above the water table. Groundwater models predict that volatile organic compound concentrations will continue to increase in the groundwater at the RWMC.

The RWMC production well is located in WMF-603 and supplies all of the drinking water for more than 300 people at the RWMC. The well was put into service in 1974. Water samples were collected at the wellhead and from the point of entry to the distribution system, which is the point of compliance, at WMF-604.

Since monitoring began at RWMC in 1988, there had been an upward trend in carbon tetrachloride concentrations until 1999 (Figure 5-2). Since 1999, carbon tetrachloride concentrations have remained fairly constant. In October 1995, the carbon tetrachloride concentrations increased to 5.48 $\mu\text{g/L}$ at the well. This was the first time the concentrations exceeded the maximum contaminant level of 5.0 $\mu\text{g/L}$. However, the maximum contaminant level for carbon tetrachloride is based on a four-quarter average and applies to the distribution

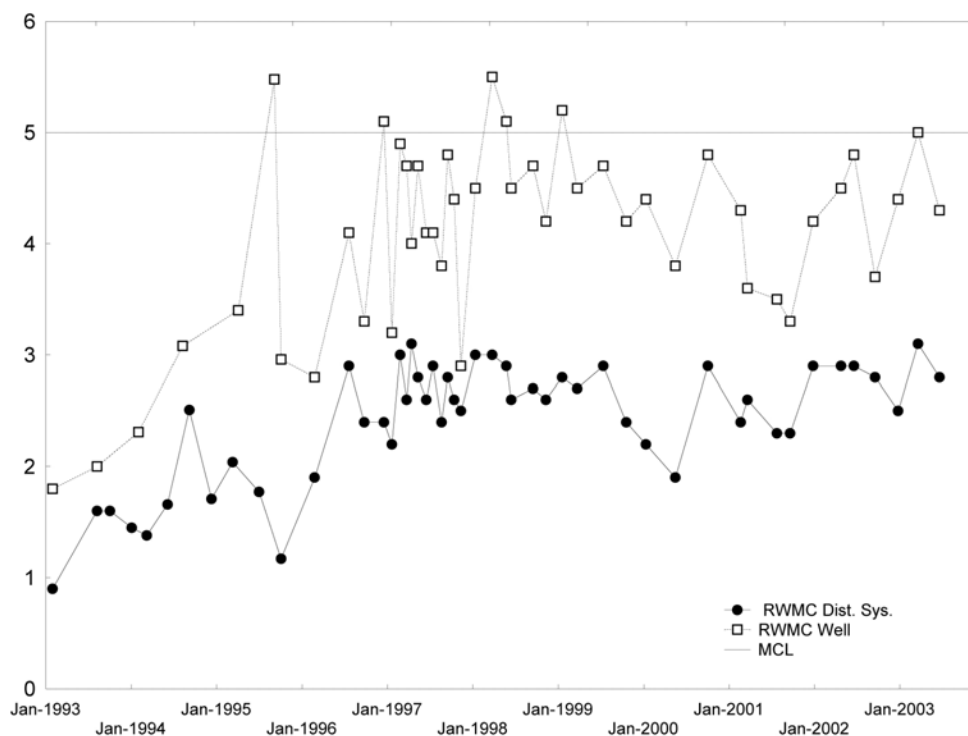


Figure 5-2. Carbon tetrachloride concentrations in the RWMC drinking water well and distribution system.

system. The distribution system is the point from which water is first consumed at RWMC and is the compliance point. Table 5-23 summarizes the carbon tetrachloride concentrations at the RWMC drinking water well and distribution system for 2003. The mean concentration at the well for 2003 was 4.57 µg/L, and the maximum concentration was 5.0 µg/L. The mean concentration at the distribution system was 2.80 µg/L, and the maximum concentration was 3.1 µg/L.

Permanent chlorination was installed in 2003 because of a history of total coliform bacteria detections. Since permanent chlorination was installed, no coliform bacteria have been detected.

Table 5-23. Carbon tetrachloride concentration in the RWMC drinking water well and distribution system (2003).

Location	Number of Samples	Carbon Tetrachloride Concentration ^a			
		Minimum	Maximum	Mean	MCL
RWMC WMF-603 Well	3	4.3	5.0	4.57	NA ^b
RWMC WMF-604 Distribution	3	2.5	3.1	2.80	5.0

a. All concentrations are in micrograms per liter (µg/L).
b. NA = Not applicable. MCL applies to the distribution system only.

Test Area North/Technical Support Facility - In 1987, trichloroethylene was detected at both TSF 1 and 2 Wells, which supply drinking water to approximately 100 employees at TSF daily. The inactive TSF injection well (TSF-05) is believed to be the principal source of trichloroethylene contamination at the TSF. Bottled water was provided until 1988 when a sparger system (air stripping process) was installed in the water storage tank to volatilize the trichloroethylene to levels below the MCL.

During the third quarter of 1997, TSF 1 Well was taken offline, and TSF 2 Well was put online as the main supply well because the trichloroethylene concentration of TSF 2 had fallen below the MCL of 5.0 µg/L. Therefore, by using TSF 2 Well, no treatment (sparger air stripping system) is currently required. TSF 1 Well is used as a backup to TSF 2 Well. If TSF 1 Well must be used, the sparger system must be activated to treat the water.

Figure 5-3 illustrates the concentrations of trichloroethylene in both TSF wells and the distribution system from 1993 through 2003. Past distribution system sample exceedances are attributed to preventive maintenance activities interrupting operation of the sparger system.

Table 5-24 summarizes the trichloroethylene concentrations at TSF 2 Well and the distribution system. Regulations do not require sampling of TSF 2 Well; however, samples were collected to monitor trichloroethylene concentrations. The distribution system is the compliance point. TSF 1 Well was not sampled during 2003 because it was not required by the regulations. The mean concentration of trichloroethylene at the distribution system for 2003 was 1.20 µg/L, which is below the MCL.



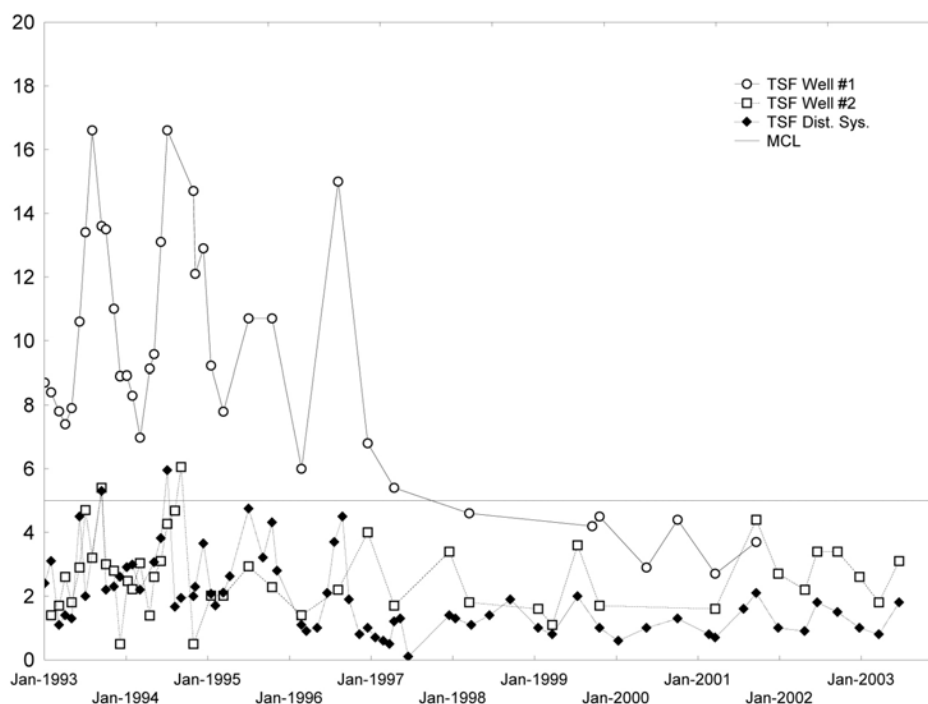


Figure 5-3. Trichloroethylene concentrations in TSF drinking water wells and distribution system.

(Note: During 2003, sampling of Well 1 was not required.)

Table 5-24. Trichloroethylene concentrations at TSF 2 Well and distribution system (2003).

Location	Number of Samples	Trichloroethylene ^a			
		Minimum	Maximum	Mean	MCL
TAN/TSF #2 Well (612) ^b	3	1.8	3.1	2.50	NA ^c
TAN/TSF Distribution (610)	3	0.8	1.5	1.20	5.0

a. All concentrations are in micrograms per liter (µg/L).

b. Regulations do not require sampling at this well.

c. NA = Not applicable. MCL applies to the distribution system only.

Argonne National Laboratory-West

During 2003, ANL-W analyzed quarterly water samples for gross alpha, gross beta, and tritium collected from a point prior to water entry to the drinking water distribution system, in accordance with the *Safe Drinking Water Act*. Values for both gross alpha concentration and gross beta concentration were well below MCLs. No detectable concentrations of tritium were reported.

ANL-W collected an annual nitrate sample as required by regulation. Results were below the EPA MCL (Table 5-22). ANL-W also tested its system quarterly for coliform bacteria with no positive results for the year.

Naval Reactors Facility

Drinking water samples were collected at a point before entering the distribution system. The samples were drawn from a sampling port immediately downstream from the NRF water softening treatment system. The water was monitored for volatile organic compounds, inorganic constituents, and water quality parameters. Radionuclides were sampled at each wellhead.

Drinking water monitoring at NRF did not detect any volatile organic compounds above minimum detection levels. No gross alpha, gross beta, programmatic gamma-emitters, or strontium-90 (^{90}Sr) were measured in excess of natural background concentrations in 2003. Tritium values were generally comparable to background concentrations and showed no increase over levels reported in 2002. For more information see the *2003 Environmental Report for the Naval Reactors Facility* (Bechtel Bettis 2003).

Offsite Drinking Water Sampling

As part of the offsite monitoring performed by the ESER contractor, radiological analyses are performed on drinking water samples taken at offsite locations. In 2003, the ESER contractor collected 28 drinking water samples from 13 offsite locations.

No drinking water samples collected during 2003 contained any gross alpha.

As in years past, measurable gross beta activity was present in most offsite drinking water samples (19 of the 28 samples). Detectable concentrations ranged from 2.89 ± 0.85 pCi/L to 9.72 ± 1.16 pCi/L (Table 5-25). The upper value of this range is below the EPA screening level for drinking water of 50 pCi/L. Concentrations in this range are normal and cannot be differentiated from the natural decay products of thorium and uranium that dissolve into water as the water passes through the basalt terrain of the Snake River Plain.

Tritium was measured in a single drinking water sample during 2003. The tritium concentration of 83.6 ± 23.7 pCi/L, was from Taber in November (Table 5-25). The maximum level is still well below the DOE's DCG of 2.0×10^6 pCi/L and the EPA MCL of 20,000 pCi/L for tritium in water. These levels can be explained by natural variability.

5.5 Storm Water Monitoring

The EPA NPDES regulations for discharges of storm water to waters of the United States require permits for discharges from industrial activities (40 CFR 122.26 2003). Under these regulations, waters of the United States at the INEEL are considered to be the

- ♦ Big Lost River;
- ♦ Little Lost River;



Table 5-25. 2003 ESER contractor offsite drinking water results.

Location	Sample Results		Limits for Comparison ^a	
	Result $\pm 2s^a$	MDC ^b	EPA MCL ^b	DOE DCG ^b
Gross Beta				
May 2003				
Aberdeen	5.24 \pm 0.94	2.66	50 ^c	100
Atomic City	3.25 \pm 0.81	2.45	50	100
Fort Hall	9.59 \pm 1.03	2.60	50	100
Idaho Falls	3.01 \pm 0.82	2.52	50	100
Minidoka	3.57 \pm 0.84	2.51	50	100
Monteview	9.72 \pm 1.16	3.03	50	100
Moreland	8.36 \pm 1.06	2.82	50	100
Mud Lake (Duplicate)	4.87 \pm 0.83	2.35	50	100
Roberts	4.38 \pm 0.86	2.51	50	100
Shoshone	4.09 \pm 0.83	2.45	50	100
November 2003				
Aberdeen	5.08 \pm 1.00	— ^d	50	100
Atomic City	2.89 \pm 0.85	—	50	100
Fort Hall	8.37 \pm 1.06	—	50	100
Minidoka	3.86 \pm 0.92	—	50	100
Monteview	4.13 \pm 0.89	—	50	100
Moreland	7.79 \pm 1.18	—	50	100
Mud Lake	5.38 \pm 0.91	—	50	100
Duplicate	4.35 \pm 0.93	—	50	100
Taber	5.16 \pm 0.99	—	50	100
Tritium				
November 2003				
Taber	83.60 \pm 23.70	—	20,000	2 \times 10 ⁶
<p>a. All values shown are in picocuries per liter (pCi/L), plus or minus the uncertainty (one standard deviations [1s]).</p> <p>b. MDC = minimum detectable concentration, MCL = maximum contaminant level, DCG = derived concentration guide.</p> <p>c. The MCL for gross beta is established as a dose of 4 mrem/yr. A screening concentration of 50 pCi/L is used to simplify comparison.</p> <p>d. As a result of improved procedures MDCs are no longer calculated.</p>				

- ♦ Birch Creek and Birch Creek Playa;
- ♦ Spreading areas;
- ♦ Big Lost River sinks; and
- ♦ Tributaries.

Together, the above locations comprise the Big Lost River System (Figure 5-4).

A Storm Water Monitoring Program was implemented in 1993 when storm water permits initially applied to the INEEL facilities. The program was modified as permit requirements changed, data were evaluated, and needs were identified. On September 30, 1998, the EPA issued the "Final Modification of the NPDES Storm Water Multi-Sector General Permit for Industrial Activities" (63 FR 189 1998) (referred to as the General Permit). The INEEL M&O contractor implemented the analytical monitoring requirements of the 1998 General Permit starting January 1, 1999. Visual monitoring was implemented starting October 1, 1998, and continues to be performed quarterly.

The General Permit was reissued in October 2000. The *Idaho National Engineering and Environmental Laboratory Storm Water Pollution Prevention Plan for Industrial Activities* was revised in 2002 to meet the requirements of the reissued General Permit (DOE-ID 2002). The Storm Water Monitoring Program meets the General Permit requirements by conducting permit-required monitoring. The General Permit requires visual monitoring during the first, third, and fifth years of the permits' duration and both analytical and visual monitoring on the second and fourth years. The General Permit requires that samples be collected and visually examined from rainstorms that accumulated at least 0.25 cm (0.1 in.) of precipitation preceded by at least 72 hrs without measurable precipitation (< 0.25 cm [< 0.1 in.]) to allow pollutants to build up and then be flushed from the drainage basin. The Storm Water Monitoring Program monitors the following facilities or activities

- ♦ Borrow sources (nonmetallic mineral mining, Sector J);
- ♦ INTEC (hazardous waste treatment, storage, and disposal, Sector K - ceased monitoring in December 2003);
- ♦ Landfills I, II, and III Extension at the CFA (Landfills, Sector L);
- ♦ RWMC (Sector K and Sector L - ceased monitoring in December 2003); and
- ♦ Specific Manufacturing Capability at TAN (transportation equipment manufacturing, Sector AB - ceased monitoring in December 2003).

In addition to the above discussed NPDES permit-required monitoring, the program monitors storm water to deep injection wells to comply with state of Idaho injection well permits. In 1997, responsibility for monitoring of storm water entering deep injection wells was transferred from the USGS to the M&O Storm Water Monitoring Program. Storm water data are reported as analytical data submitted to the EPA in a discharge monitoring report; as General Permit visual



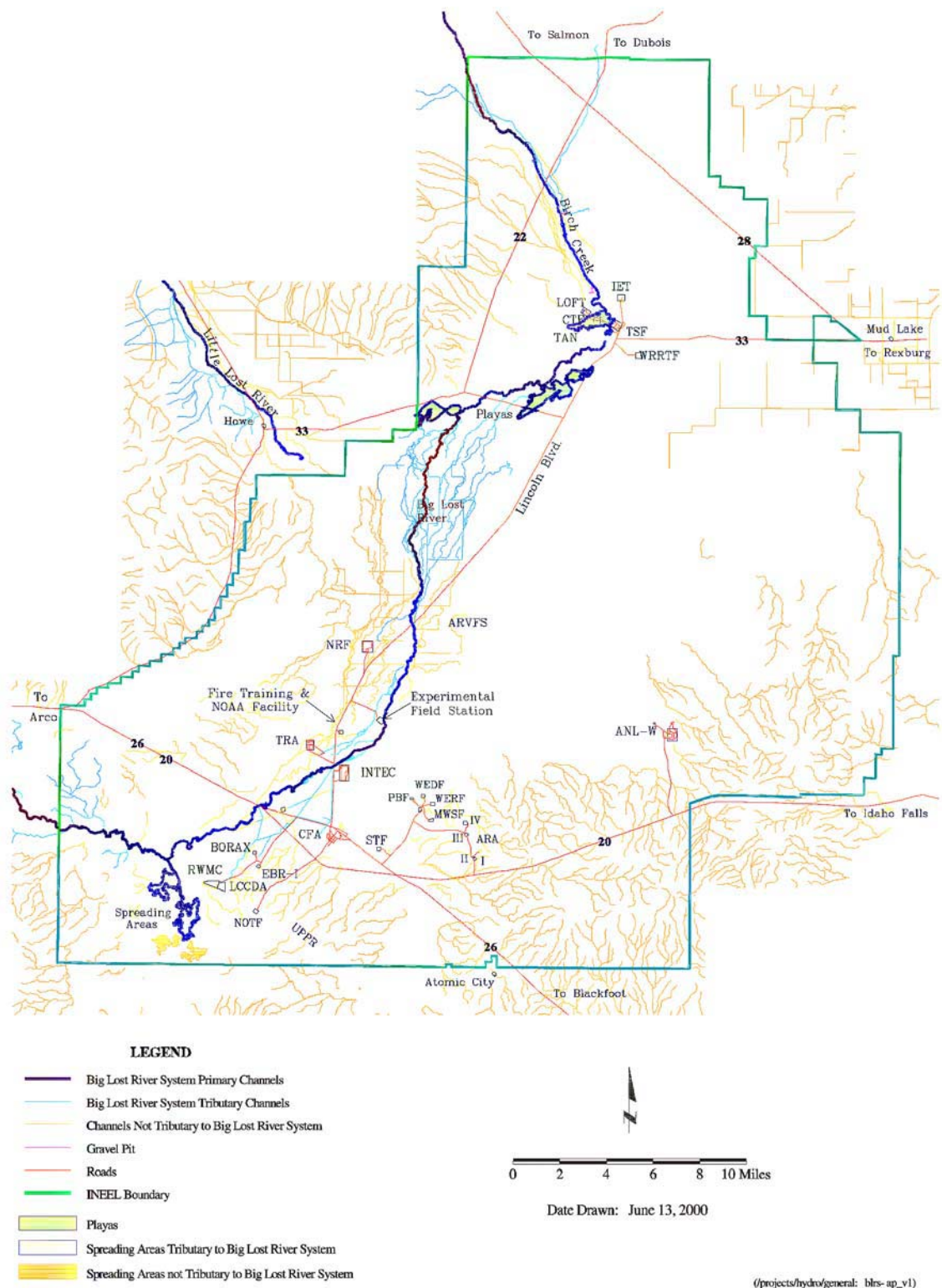


Figure 5-4. Big Lost River System.

data and analytical data included in the annual revisions of the plan; or data for storm water discharged to deep injection wells reported to the Idaho Department of Water Resources.

A total of thirty-four sites at five INEEL areas are designated as storm water monitoring locations based upon drainage patterns and proximity to potential sources of pollutants. Twenty-seven of these locations met the conditions for quarterly visual monitoring required by the General Permit when discharges occur to the Big Lost River System. The General Permit requires visual examinations of storm water for obvious indications of storm water pollution. In addition, visual examinations were conducted for surveillance purposes at some locations whether or not storm water discharged to the Big Lost River System.

The General Permit does not contain numeric limitations for analytical parameters, except for pH limitations from runoff from coal piles, such as the one at INTEC. Other parameters are compared to benchmark concentrations to help evaluate the quality of storm water discharges.

In a letter dated October 27, 2003, to the DOE-ID chief counsel, EPA Region 10 determined that three sites at the INEEL (RWMC, INTEC, and the north part of the INEEL property near Birch Creek [area around TAN]) do not have a reasonable potential to discharge storm water to waters of the United States (Ryan 2003). A subsequent letter on December 15, 2003, from the DOE-ID contract officer to the BBWI Prime Contracts manager directed the M&O contractor to cease expending further resources on compliance with the Storm Water Pollution Prevention Plan for Industrial Activities, Storm Water Pollution Prevention Plan for Construction Activities, and Spill Prevention Control and Countermeasures Programs at the three sites discussed in the letter from EPA (Bauer 2003). The letter further directed BBWI to conduct a technical analysis to determine any other areas under the M&O contractor's evaluation that would also have the same or less potential to discharge storm water to waters of the United States. As a result of this direction by DOE-ID, construction and industrial storm water inspections, data collection, and reports have ceased for projects located at those facilities.

The remaining projects will be evaluated through the technical analysis requested by DOE-ID to determine potential to discharge. Required storm water inspections and reporting will continue for these projects until the technical analysis is complete. At that time, inspections and reports at any additional projects that have no reasonable potential to discharge to waters of the United States, as determined through the technical analysis, will cease.

Storm Water Monitoring Results

During 2003, 68 visual storm water examinations were performed at 22 locations. No rainfall, snowmelt, or discharge down injection wells was observed at 14 monitoring points; therefore, no visual examinations were performed or analytical samples collected at those locations.

The visual examinations performed in 2003 showed satisfactory implementation of the *INEEL Storm Water Pollution Prevention Plan for Industrial Activities* (DOE-ID 2002), and no corrective actions were required or performed during the year.





Analytical samples were collected for qualifying rain events that potentially discharged to waters of the United States at applicable monitoring locations. Potential discharges to waters of the United States from a qualifying storm occurred at two locations at the RWMC. Location RWMC-MP-1/2 is in a culvert on the east side of the Operations Area, on the north side of the main channel flow system, and RWMC-MP-4/1 is located in a culvert on the west side of the main channel flow system. Although the potential for discharge to waters of the United States exists, there was no indication that such a discharge occurred for these events. In addition, discharge to waters of the United States from a qualifying storm occurred at the T-28 north gravel pit (TAN-MP-1/1 [inflow to gravel pit] and TAN-MP-2/1 [outflow from gavel pit]). Tables 5-26 through 5-29 summarize the 2003 results and permit benchmark concentrations for these four locations.

Table 5-26. RWMC-MP-1/2 storm water results for 2003.

Parameter^a	Maximum	# Samples	# Detections^b	Benchmark
Cyanide	0.0050 U ^c	1	0	0.0636
Chemical Oxygen Demand	112	1	1	120
Nitrogen, as Ammonia	0.155	1	1	NA
Total Suspended Solids	274 ^d	1	1	100
Silver	0.0134	1	1	0.0318
Arsenic	0.00638	1	1	0.16854
Cadmium	0.000625	1	1	0.0159
Iron	6.420 ^d	1	1	1
Mercury	0.00007 U	1	0	0.0024
Magnesium	20.6 ^d	1	1	0.0636
Lead	0.0101	1	1	0.0816
Selenium	0.00630 U	1	0	0.2385
Conductivity (µS)	896.7	1	1	NA
pH (standard units)	7.80	1	1	6.0–9.0

a. All values are in milligrams per liter (mg/L) unless otherwise noted.

b. # detections indicate the number of samples with results greater than the minimum detectable limit for that constituent.

c. U flag indicates that the result was below the detection limit.

d. Benchmarks exceeded.

Table 5-27. 2003 storm water results for RWMC-MP-4/1.

Parameter ^a	Maximum	# Samples	# Detections ^b	Benchmark
Cyanide	0.0050 U ^c	1	0	0.0636
Chemical Oxygen Demand	147 ^d	1	1	120
Nitrogen, as Ammonia	1.62	1	1	NA
Total Suspended Solids	160 ^d	1	1	100
Silver	0.00123 U	1	0	0.0318
Arsenic	0.00868	1	1	0.16854
Cadmium	0.00035 U	1	0	0.0159
Iron	3.08 ^d	1	1	1
Mercury	0.00007 U	1	0	0.0024
Magnesium	7.71 ^d	1	1	0.0636
Lead	0.00783	1	1	0.0816
Selenium	0.0063 U	1	0	0.2385
Conductivity (µS)	1,871	1	1	NA
pH (standard units)	8.11	1	1	6.0–9.0

a. All values are in milligrams per liter (mg/L) unless otherwise noted.

b. # Detections indicates the number of samples with results greater than the minimum detectable limit for that constituent.

c. U flag indicates that the result was below the detection limit.

d. Benchmarks exceeded.

Table 5-28. TAN-MP-1/1 (in flow) storm water results (2003).

Parameter ^a	Concentration	# Samples	# Detections ^b	Benchmark
Nitrogen, Nitrate+Nitrite	0.5	1	1	0.68
Total Suspended Solids	5 U ^c	1	0	100
Conductivity (µS)	312.5	1	1	NA
pH (standard units)	8.28	1	1	6.0–9.0

a. All values are in milligrams per liter (mg/L) unless otherwise noted.

b. # Detections indicates the number of samples with results greater than the minimum detectable limit for that constituent.

c. U flag indicates that the result was below the detection limit.



Table 5-29. TAN-MP-2/1 (out flow) storm water results (2003).

Parameter ^a	Concentration	# Samples	# Detections ^b	Benchmark
Nitrogen, Nitrate+Nitrite	1.50	1	1	NA
Total Suspended Solids	5 U ^c	1	0	100
Conductivity (µS)	310.3	1	1	NA
pH (standard units)	8.22	1	1	6.0–9.0

a. All values are in milligrams per liter (mg/L) unless otherwise noted.

b. # Detections indicates the number of samples with results greater than the minimum detectable limit for that constituent.

c. U flag indicates that the result was below the detection limit.

The measured concentrations for TSS, iron, and magnesium exceeded the benchmark concentration levels at both RWMC locations. In addition, COD exceeded the benchmark concentration for the sample collected at RWMC-MP-4/1. These parameters have been above benchmark concentrations at these locations in the past. No deficiencies in pollution prevention practices have been identified in these areas that would lead to high concentrations for these parameters, and no definite cause has been identified. However, iron and magnesium are common soil-forming minerals and may be attributed to suspended sediment, deposited onsite from high winds and landfill operations, in the storm water discharge. Storm drain filters for petroleum and sediment are in place and maintained regularly to provide additional pollution prevention.

No benchmark concentrations were exceeded at the T-28 north gravel pit.

5.6 Waste Management Surveillance Water Sampling

In compliance with DOE Order 435.1, the M&O contractor collects surface water, as surface runoff, at the Waste Experimental Reduction Facility (WERF) and the RWMC from the locations shown in Figures 5-5 and 5-6, respectively. Two control locations approximately 2 km (1.24 mi) north of the RWMC are sampled. The control location for the WERF is on the west side of the restrooms at the Big Lost River Rest Area. The control location for the RWMC subsurface discharge area (SDA) is 1.5 km (0.93 mi) west from the Van Buren Boulevard intersection on U.S. Highway 20/26 and 10 m (33 ft) north on the T-12 road.

Surface water is collected to determine if radionuclide concentrations exceed alert levels or if concentrations have increased significantly compared to historical data. Since 1994, quarterly surface water runoff samples have been collected at the WERF seepage basins to determine if contamination has been released from stored waste.

Surface water runoff samples were collected during the second quarter of 2003 at WERF. No gamma-emitting radionuclides were detected.

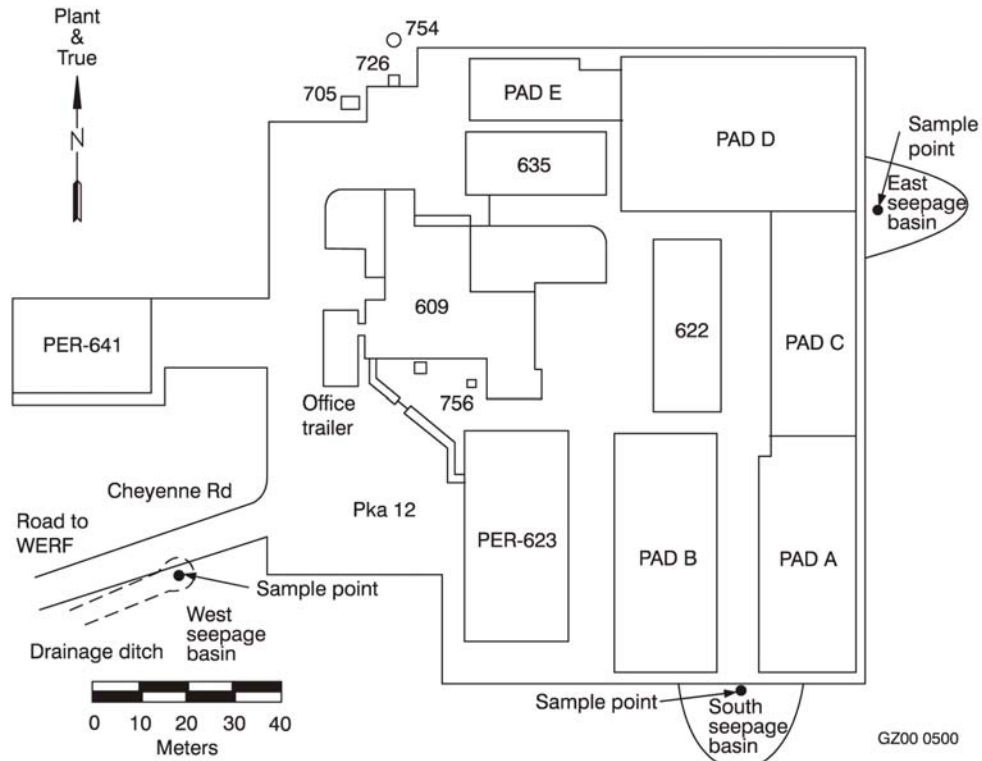


Figure 5-5. WERF surface water sampling locations.

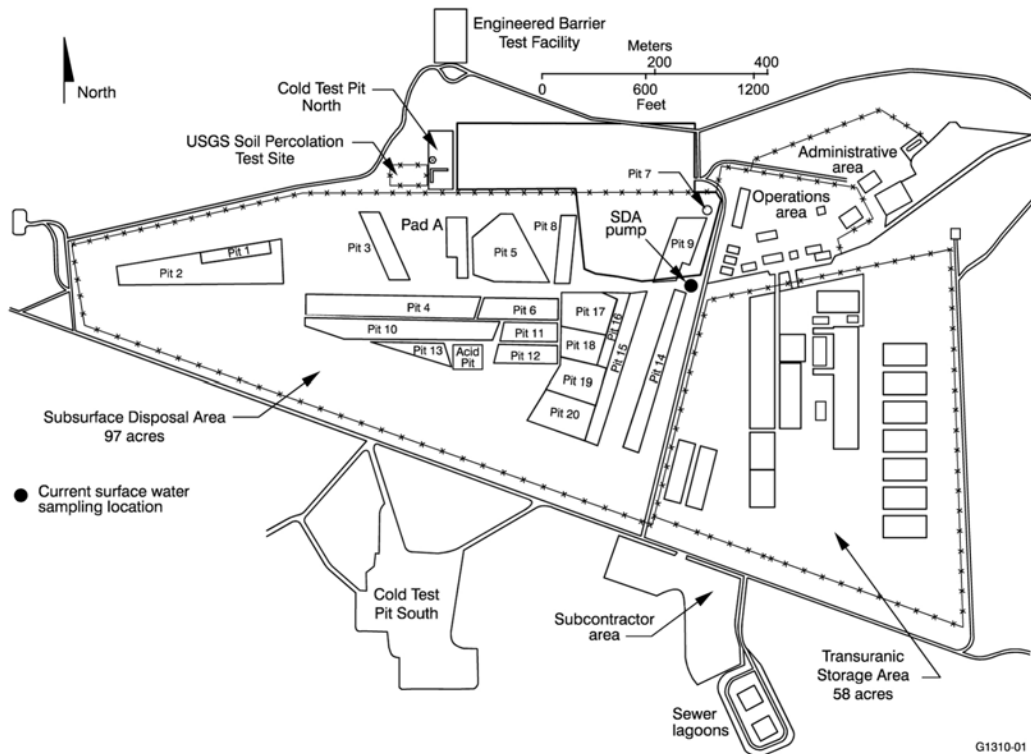


Figure 5-6. RWMC surface water sampling locations.

Radionuclides could be transported outside the RWMC boundaries via surface water runoff. Surface water runs off at the SDA only during periods of rapid snowmelt or heavy precipitation. At these times, water may be pumped out of the SDA into a drainage canal, which directs the flow outside the RWMC. The canal also carries runoff from outside the RWMC that has been diverted around the SDA. Because of drought conditions, no surface water runoff was available for sampling at the RWMC SDA during 2003.



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